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State of California  
The Resources Agency  
Department of Water Resources

**RECREATION AND PUBLIC USE IMPACT  
ASSESSMENT**

***FINAL***

**R-11**

**Oroville Facilities Relicensing  
FERC Project No. 2100**



JANUARY 2004

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FERC Project No. 2100**

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## REPORT SUMMARY

This document presents the Recreation and Public Use Impact Assessment, one of several recreation studies being conducted as part of the Oroville Facilities relicensing process. This study included a qualitative assessment of ecological impacts attributed to recreation and public use at recreation sites and areas in the study area. This report summarizes the recreation and public use impacts to vegetation, soils, and water quality at Project recreation facilities.

The California Department of Water Resources (DWR) commissioned this study as part of the relicensing process for the preparation of a license application to be submitted to the Federal Energy Regulatory Commission (FERC) for the Oroville Facilities (FERC Project No. 2100). As part of this relicensing process, a series of related studies are being conducted to assess and evaluate recreation resources associated with the Oroville Facilities. This report presents the results of one of those studies: an evaluation of public use impact in the study area, which is defined as the area inside and within ¼ mile of the FERC Project Boundary.

This study first identifies dispersed recreation sites within the study area. Then it discusses what indicators are evaluated and what impacts they may cause. This study is needed because FERC regulations require a comprehensive recreation plan. As a part of this plan, conditions of existing recreation facilities are considered. This study compiles and analyzes field data collected in the study area related to ecological impacts at developed recreation sites and undeveloped dispersed recreation sites.

As a part of the study, the following indicators were qualitatively analyzed to evaluate potential recreation and public use impacts or concerns related to sensitive ecological resources:

- € Soil erosion;
- € Soil compaction;
- € Fugitive dust;
- € Trash accumulation;
- € Sanitation;
- € Vegetation damage;
- € Prevalence of user-defined trails;
- € Impacts to wetlands;
- € Impacts to riparian zones;
- € Prevalence of downed wood;
- € Impacts to shoreline and water quality;
- € Off-highway vehicle (OHV)-related impacts (evaluated at dispersed sites); and
- € Estimated use levels (evaluated at dispersed sites).

Cultural resource impacts are not addressed in this study; impacts to cultural resources are evaluated in other relicensing studies. Those studies have identified numerous sensitive cultural resource sites in the study area.

Researchers observed study area sites and areas – walking and driving – looking for recreation and public use-related impacts. The results were recorded on assessment forms; notes relating to this qualitative assessment were also included. Two observation periods occurred, one in the summer and another in the winter.

An overall level of impact for each site and indicator was assigned based on a comparison of the two observation periods. Overall, developed recreation sites exhibited few impacts. However, the following few developed recreation sites were identified as areas of higher concern compared to others in the study area:

- ✧ Afterbay Outlet Campground and Day Use Area (DUA);
- ✧ Clay Pit State Vehicular Recreation Area (SVRA);
- ✧ Foreman Creek Car-top Boat Ramp (BR);
- ✧ Rabe Road Shooting Range; and
- ✧ Saddle Dam DUA.

The overall level of impact at dispersed recreation sites and areas was greater compared to developed recreation sites. The following dispersed recreation sites were identified as being of high concern:

- ✧ Old Nelson Bar Road Dispersed Site;
- ✧ Oroville Wildlife Area (OWA) – Headquarters Entrance Dispersed Use Area;
- ✧ OWA - Pacific Heights Road Highway 70 Entrances Dispersed Use Area;
- ✧ OWA – Palm Avenue Entrance Dispersed Use Area; and
- ✧ Ponderosa Dam Dispersed Site.

Additionally, the following indicators were identified as being of high concern at dispersed recreation sites and areas (there were no indicators identified as being of high concern at developed recreation sites or areas):

- ✧ OHV impact;
- ✧ Trash accumulation; and
- ✧ User-defined trails.

Potential management responses in the study area to commonly observed Project-wide concerns may generally include:

- ✧ Placement and servicing of trash receptacles at sites with excessive amounts of litter;
- ✧ Providing visitor education regarding low impact recreational techniques;

- € Hardening of heavily used areas to reduce vegetation damage and erosion;
- € Providing visitor education regarding the potential impacts of use near river and reservoir shorelines;
- € Limiting the number of OHV roads or preventing OHV access in some dispersed use areas;
- € Providing visitor education regarding potential OHV use impacts in sensitive ecological areas (wetland, riparian); and
- € Periodically monitoring conditions over time using current data as a baseline, and adopting management responses to changes in use over time.

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## **ABBREVIATIONS AND ACRONYMS**

af	acre-foot
BIC	boat-in campground
BR	boat ramp
cfs	cubic feet per second
DFG	California Department of Fish and Game
DPR	California Department of Parks and Recreation
DUA	day use area
DWR	California Department of Water Resources
FERC	Federal Energy Regulatory Commission
FRSA	Feather River Service Area
GIS	geographic information system
ISO	Independent System Operator
maf	million acre-feet
msl	mean sea level
MW	Megawatt
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OWA	Oroville Wildlife Area
PWC	personal watercraft
RM	river mile
SVRA	State Vehicular Recreation Area
SWP	State Water Project
USACE	U.S. Army Corps of Engineers

## **1.0 INTRODUCTION**

This document presents the results of the Recreation and Public Use Impact Analysis, one of several recreation studies being conducted as part of the Oroville Facilities relicensing process. This study included a qualitative assessment of ecological impacts attributed to recreation and public use at recreation sites and areas in the study area. This report summarizes the recreation and public use impacts to vegetation, soils, and water quality at Project recreation facilities. This summary report includes inventory tables of public use impacts observed by site, as well as text descriptions of sites and impacts, selected photography of observed impacts, and geographic information system (GIS) mapping of developed and dispersed sites.

The California Department of Water Resources (DWR) commissioned this study as part of the relicensing process to culminate in the preparation of a license application to be submitted to the Federal Energy Regulatory Commission (FERC) for the Oroville Facilities (FERC Project No. 2100). As part of this relicensing process, a range of related studies are being conducted to assess and evaluate recreation resources associated with the Oroville Facilities. This study focuses on public use and recreation-related impacts in and adjacent to developed and dispersed recreation sites in the study area. The results of this study provide baseline information and could support future periodic monitoring of recreation and public use sites.

Other relicensing studies complement the scope of this report. The relicensing study R10 – Recreation Facility and Condition Inventory, also evaluates the condition of the developed facilities within the study area. In addition, two other relicensing studies address recreational and public use impacts on ecological resources in the study area: W3 – Recreation Facilities and Operations Effects on Water Quality and T9 – Recreation and Wildlife.

### **1.1 BACKGROUND INFORMATION**

Lake Oroville is the second largest reservoir in California, after Shasta Lake. Numerous existing facilities at Lake Oroville offer a variety of recreational opportunities, including boating, fishing, and camping. Opportunities to camp in the area range from fully developed campgrounds to primitive, less-developed sites. Boat-in and floating campsites also exist. There are two full-service marinas, six boat launches, eight car-top boat launches, ten floating campsites, seven floating toilets, and a visitor center located in the Lake Oroville vicinity. At Lake Oroville itself, there are major developed recreation facilities at Loafer Creek, Bidwell Canyon, Spillway, and Lime Saddle. Other recreation opportunities include picnicking, swimming, horseback riding, hiking, off-road bicycle riding, personal watercraft (PWC) use, wildlife watching, and hunting. The area also offers visitor information sites with cultural and informational displays about Project facilities and the area's natural and cultural environment. Additional recreational and

visitor facilities are located at Thermalito Diversion Pool, Thermalito Forebay, Thermalito Afterbay, and the Oroville Wildlife Area (OWA).

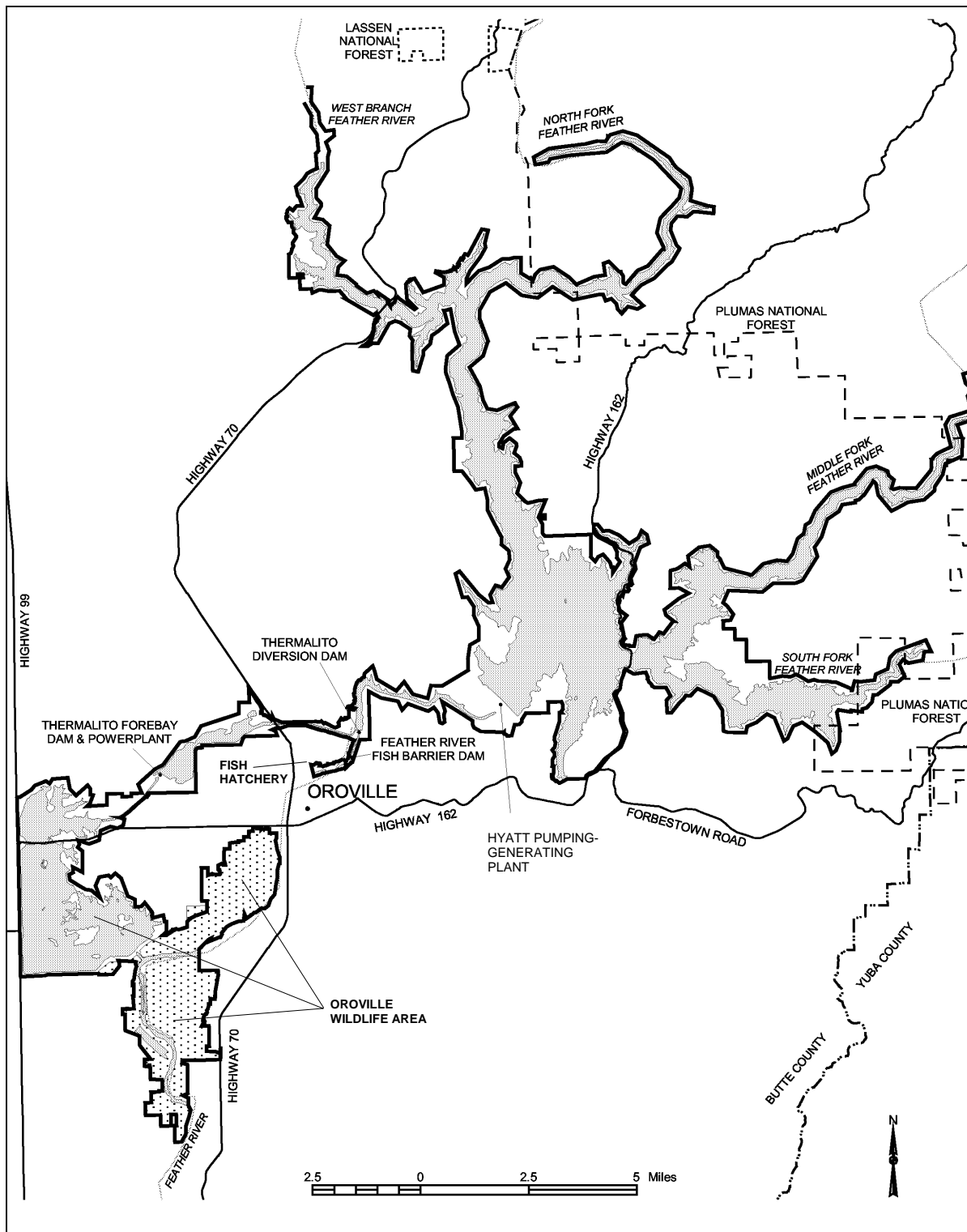
## **1.2 DESCRIPTION OF FACILITIES**

The Oroville Facilities were developed as part of the State Water Project (SWP) – a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants. The main purpose of the SWP is to store and distribute water to supplement the needs of urban and agricultural water users in Northern California, the San Francisco Bay area, the San Joaquin Valley, and Southern California. The Oroville Facilities are also operated for flood control, power generation, to improve water quality in the Sacramento–San Joaquin Delta, enhance fish and wildlife, and provide recreation.

FERC Project No. 2100 (Figure 1.2-1) encompasses 41,100 acres and includes Oroville Dam and Reservoir, three power plants (Hyatt Pumping-Generating Plant, Thermalito Diversion Dam Power Plant, and Thermalito Pumping-Generating Plant), Thermalito Diversion Dam, the Feather River Fish Hatchery and Fish Barrier Dam, Thermalito Power Canal, OWA, Thermalito Forebay and Forebay Dam, Thermalito Afterbay and Afterbay Dam, transmission lines, and a relatively large number of recreational facilities. Oroville Dam, along with two small saddle dams, impounds Lake Oroville, a 3.5-million-acre-foot (maf) capacity storage reservoir with a surface area of 15,810 acres at its maximum normal operating level of 900 feet above mean sea level (msl).

The hydroelectric facilities have a combined licensed generating capacity of approximately 762 megawatts (MW). The Hyatt Pumping-Generating Plant is the largest of the three power plants with a capacity of 645 MW. Water from the six-unit underground power plant (three conventional generating and three pumping-generating units) is discharged through two tunnels into the Feather River just downstream of Oroville Dam. The plant has a generating and pumping flow capacity of 16,950 cubic feet per second (cfs) and 5,610 cfs, respectively. Other generation facilities include the 3-MW Thermalito Diversion Dam Power Plant and the 114-MW Thermalito Pumping-Generating Plant.

Thermalito Diversion Dam, 4 miles downstream of the Oroville Dam, creates a tailwater pool for the Hyatt Pumping-Generating Plant and is used to divert water into the Thermalito Power Canal. Thermalito Diversion Dam Power Plant is located on the left abutment of the Diversion Dam. The power plant releases a maximum of 615 cfs into the river.



**Figure 1.2-1. Oroville Facilities FERC Project Boundary.**

The Power Canal is a 10,000-foot-long channel designed to convey generating flows of 16,900 cfs to the Thermalito Forebay and pump-back flows to the Hyatt Pumping-Generating Plant. Thermalito Forebay is an off-stream regulating reservoir for the 114-MW Thermalito Pumping-Generating Plant. The Thermalito Pumping-Generating Plant is designed to operate in tandem with the Hyatt Pumping-Generating Plant and has generating and pump-back flow capacities of 17,400 cfs and 9,120 cfs, respectively. When in generating mode, the Thermalito Pumping-Generating Plant discharges into Thermalito Afterbay, which is contained by a 42,000-foot-long earth-fill dam. The Afterbay, which is used to release water into the Feather River downstream of the Oroville Facilities, helps regulate the power system, provides storage for pump-back operations, provides recreational opportunities, and provides local irrigation water. Several local irrigation districts also receive Lake Oroville water via the Afterbay.

The Feather River Fish Barrier Dam is downstream of the Thermalito Diversion Dam and immediately upstream of the Feather River Fish Hatchery. The flow over the dam maintains fish habitat in the low-flow channel of the Feather River between the dam and the Afterbay outlet, and provides attraction flow for the hatchery. The hatchery is an anadromous fish hatchery intended to compensate for salmon and steelhead spawning grounds made unreachable by construction of Oroville Dam. Hatchery facilities have a production capacity of 10 million fall-run salmon, 5 million spring-run salmon, and 450,000 steelhead annually (pers. comm., Kastner 2003). Diseases have occasionally reduced hatchery production in recent years, however.

The Oroville Facilities support a variety of recreational opportunities, such as several types of boating and fishing, fully developed and primitive camping (including boat-in and floating sites), picnicking, swimming, horseback riding, hiking, off-road bicycle riding, wildlife watching, hunting, and visitor information sites with cultural and informational displays about the developed facilities and the natural environment. There are major recreation facilities at Loafer Creek, Bidwell Canyon, Spillway, Lime Saddle, and Thermalito Forebay. Lake Oroville has two full-service marinas, five car-top boat launch ramps, 10 floating campsites, and seven two-stalled floating toilets. There are also recreation facilities at the Lake Oroville Visitors Center, Thermalito Afterbay, and the OWA.

The OWA comprises approximately 11,000 acres west of Oroville that are managed for wildlife habitat and recreational activities. It includes the Thermalito Afterbay and surrounding lands (approximately 6,000 acres) along with 5,000 acres adjoining the Feather River. The 5,000-acre area is adjacent to or straddles 12 miles of the Feather River, and includes willow and cottonwood-lined ponds, islands, and channels. Recreation areas include dispersed recreation (hunting, fishing, and bird watching), plus recreation at developed sites, including Monument Hill Day Use Area (DUA), model airplane grounds, two primitive camping areas, and three boat launches on the afterbay and two on the river. California Department of Fish and Game's (DFG) habitat enhancement program includes a wood duck nest-box program and dry land farming for



nesting cover and improved wildlife forage. Limited gravel extraction also occurs in a few locations.

### **1.3 CURRENT OPERATIONAL CONSTRAINTS**

Operation of the Oroville Facilities varies seasonally, weekly, and hourly, depending on hydrology and the objectives that DWR is trying to meet. Typically, releases to the Feather River are managed to conserve water while meeting a variety of water delivery requirements, including flow, temperature, fisheries, diversion, and water quality. Lake Oroville stores winter and spring runoff for release to the Feather River as necessary for Project purposes. Meeting the water supply objectives of the SWP has always been the primary consideration for determining Oroville Facilities operation (within the regulatory constraints specified for flood control, instream fisheries, and downstream uses). Power production is scheduled within the boundaries specified by the water operations criteria noted above. Annual operations planning is conducted for multi-year carryover storage. The current methodology is to retain half of the Lake Oroville storage above a specific level for subsequent years. Currently, that level has been established at 1,000,000 acre-feet (af); however, this does not limit drawdown of the reservoir below that level. If hydrology is drier or requirements greater than expected, additional water could be released from Lake Oroville. The operations plan is updated regularly to reflect forecast changes in hydrology and downstream operations. Typically, Lake Oroville is filled near its maximum operating level of 900 feet above msl in June and then lowered as necessary to meet downstream requirements, to a minimum level in December or January (occasionally below 700 feet msl). During drier years, the reservoir may be drawn down more and may not fill to desired levels the following spring. Project operations are directly constrained by downstream operational demands and flood management criteria, as described below.

#### **1.3.1 Downstream Operation**

An August 1983 agreement between DWR and DFG, entitled “Agreement Concerning the Operation of the Oroville Division of the State Water Project for Management of Fish & Wildlife,” sets criteria and objectives for flow and temperatures in the low-flow channel and the reach of the Feather River between Thermalito Afterbay and Verona. This agreement: (1) establishes minimum flows between Thermalito Afterbay Outlet and Verona, which vary by water year type; (2) requires flow changes under 2,500 cfs to be reduced by no more than 200 cfs during any 24-hour period (except for flood management, failures, etc.); (3) requires flow stability during the peak of the fall-run Chinook salmon spawning season; and (4) sets an objective of suitable temperature conditions during the fall months for salmon and during the later spring/summer for shad and striped bass.

### **1.3.1.1 Instream Flow Requirements**

The Oroville Facilities are operated to meet minimum flows in the lower Feather River as established by the aforementioned 1983 agreement. The agreement specifies that the Oroville Facilities release a minimum of 600 cfs into the Feather River from the Thermalito Diversion Dam for fisheries purposes. This is the total volume of normal flow from the Diversion Dam outlet, Diversion Dam Powerplant, and the Feather River Fish Hatchery pipeline.

Generally, the instream flow requirements below Thermalito Afterbay are 1,700 cfs from October through March, and 1,000 cfs from April through September. However, if runoff for the previous April through July period is less than 1,942,000 af (i.e., the 1911-1960 mean unimpaired runoff near Oroville), the minimum flow can be reduced to 1,200 cfs from October to February, and 1,000 cfs for March. A maximum flow of 2,500 cfs is not exceeded from October 15 through November 30, to prevent spawning in overbank areas that might become dewatered.

### **1.3.1.2 Temperature Requirements**

The Diversion Pool provides the water supply for the Feather River Fish Hatchery. The hatchery temperature objectives are 52°F for September, 51°F for October and November, 55°F for December through March, 51°F for April through May 15, 55°F for last half of May, 56°F for June 1-15, 60°F for June 16 through August 15, and 58°F for August 16-31. In April through November, a temperature range of plus or minus 4°F is allowed for objectives.

There are several temperature objectives for the Feather River downstream of the Afterbay outlet. During the fall months, after September 15, the temperatures must be suitable for fall-run Chinook salmon. From May through August, the temperatures must be suitable for shad, striped bass, and other fish.

National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries, formerly the National Marine Fisheries Service [NMFS]) has also established an explicit criterion for steelhead trout and spring-run Chinook salmon, included in a biological opinion on the effects of the Central Valley Project and SWP on Central Valley spring-run Chinook and steelhead. As a reasonable and prudent measure, DWR attempts to control water temperature at Feather River Mile (RM) 61.6 (Robinson's Riffle in the low-flow channel) from June 1 through September 30. This measure attempts to maintain water temperatures less than or equal to 65°F on a daily average. The requirement is not intended to preclude pump-back operations at the Oroville Facilities needed to assist the State of California with supplying energy during periods when the California Independent System Operator (ISO) anticipates a Stage 2 or higher alert.

The hatchery and river water temperature objectives sometimes conflict with temperatures desired by agricultural diverters. Under existing agreements, DWR provides water for the Feather River Service Area (FRSA) contractors. The contractors claim a need for warmer water during spring and summer for rice germination and growth (i.e., minimum 65°F from approximately April through mid-May, and minimum 59°F during the remainder of the growing season), though there is no explicit obligation for DWR to meet the rice water temperature goals. However, to the extent practical, DWR does use its operational flexibility to accommodate the FRSA contractors' temperature goals.

### **1.3.1.3 Water Diversions**

Monthly irrigation diversions of up to 190,000 af (e.g., in July 2002) are made from the Thermalito Complex during the May through August irrigation season. Total annual entitlement of the Butte and Sutter County agricultural users is approximately 1 maf. After meeting these local demands, flows into the lower Feather River (and outside of the FERC Project boundary) continue into the Sacramento River and into the Sacramento-San Joaquin Delta. In the northwestern portion of the Delta, water is pumped into the North Bay Aqueduct. In the south Delta, water is diverted into Clifton Court Forebay and stored until it is pumped into the California Aqueduct.

### **1.3.1.4 Water Quality**

Flows through the Delta are maintained to meet Bay-Delta water quality standards arising from DWR's water rights permits. These standards are designed to meet several water quality objectives such as salinity, Delta outflow, river flows, and export limits. The purpose of these objectives is to attain the highest reasonable water quality, considering all demands being made on the Bay-Delta waters. In particular, they protect a wide range of fish and wildlife including Chinook salmon, Delta smelt, striped bass, and the habitat of estuarine-dependent species.

## **1.3.2 Flood Management**

The Oroville Facilities are an integral component of the flood management system for the Sacramento Valley. During the wintertime, the Oroville Facilities are operated under flood control requirements specified by the U.S. Army Corps of Engineers (USACE). Under these requirements, Lake Oroville is operated to maintain up to 750,000 af of storage space to allow for the capture of significant inflows. Flood control releases are based on the release schedule in the flood control diagram or the emergency spillway release diagram prepared by the USACE, whichever requires the greater release. Decisions regarding such releases are made in consultation with the USACE. The flood control requirements are an example of multiple use of reservoir space. When flood management space is not required to accomplish flood management

objectives, the reservoir space can be used for storing water. From October through March, the maximum allowable storage limit (point at which specific flood release would have to be made) varies from about 2.8 to 3.2 maf to ensure adequate space in Lake Oroville to handle flood flows. The actual encroachment demarcation is based on a wetness index, computed from accumulated basin precipitation. This allows higher levels in the reservoir when the prevailing hydrology is dry. When the wetness index is high in the basin (i.e., high potential runoff from the watershed above Lake Oroville), required flood management space is at its greatest to provide the necessary flood protection. From April through June, the maximum allowable storage limit is increased as the flooding potential decreases, which allows capture of the higher spring flows for use later in the year. During September, the maximum allowable storage decreases again to prepare for the next flood season. During flood events, actual storage may encroach into the flood reservation zone to prevent or minimize downstream flooding along the Feather River.

## **2.0 NEED FOR STUDY**

This study is needed because FERC regulations require that a comprehensive recreation plan be developed by the licensee. As a part of this plan, conditions of existing recreation areas are considered. This study compiles and analyzes field data related to ecological impacts at developed recreation sites and undeveloped dispersed recreation sites collected in the study area.

Early in the Oroville facilities relicensing process, a large number of stakeholders' issues were consolidated into several "Issue Statements." This study addresses Issue Statement R1—adequacy of existing Project recreation facilities, opportunities, and access to accommodate current use and future demand and R4—adequacy of operations and maintenance and clean-up activities associated with existing and new recreation areas to provide a quality recreation experience.

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### **3.0 STUDY OBJECTIVE**

The objective of this study is to qualitatively assess recreation and public use impacts to vegetation, soils, and water quality at study area recreation sites and areas. This analysis also includes identifying dispersed recreation sites and areas and assessing impacts at these areas.

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## **4.0 METHODOLOGY**

The study area of this report includes Project recreation sites and use areas, and adjacent recreation sites within ¼ mile of the FERC boundary. Dispersed use recreation sites and areas were also evaluated for this study. These sites and areas were identified and qualitatively assessed as described below.

### **4.1 LAKE OROVILLE DEVELOPED RECREATION SITES AND AREAS**

Study area developed recreation sites and areas are inventoried as a part of relicensing study R-10 – Recreation Facility Inventory and Condition Inventory (DWR 2003). The following are the developed sites and areas included as a part of R11 – Recreation and Public Use Impact Assessment:

- ∄ Afterbay Outlet Campground and DUA
- ∄ Bidwell Canyon Boat Ramp (BR)
- ∄ Bidwell Canyon Campground
- ∄ Bidwell Canyon DUA
- ∄ Bidwell Canyon Marina
- ∄ Bloomer Cove Area Boat-In Campground (BIC)
- ∄ Clay Pit State Vehicular Recreation Area (SVRA)
- ∄ Craig Saddle BIC
- ∄ Dark Canyon Car-top BR
- ∄ Diversion Pool DUA
- ∄ Enterprise BR
- ∄ Feather River Fish Hatchery
- ∄ Foreman Creek BIC
- ∄ Foreman Creek Car-top BR
- ∄ Goat Ranch BIC
- ∄ Lake Oroville Visitors Center
- ∄ Larkin Road DUA and BR (Thermalito Afterbay)
- ∄ Lime Saddle BR and DUA
- ∄ Lime Saddle Campground and Group Campground
- ∄ Loafer Creek BR
- ∄ Loafer Creek Campground and Group Campground
- ∄ Loafer Creek DUA
- ∄ Loafer Creek Horse Campground
- ∄ Model Aircraft Flying Area
- ∄ Monument Hill DUA and BR
- ∄ Nelson Bar Car-top BR
- ∄ North Thermalito Forebay DUA and BR/Aquatic Center
- ∄ Oroville Dam Overlook DUA

- € Rabe Road Shooting Range
- € Riverbend Park
- € Saddle Dam DUA
- € South Thermalito Forebay DUA and BR
- € Spillway BR and DUA
- € Stringtown Car-top BR
- € Vinton Gulch Car-top BR
- € Wilbur Road BR (Thermalito Afterbay)

## **4.2 STUDY AREA DISPERSED SITES AND AREAS**

This section defines and identifies dispersed use sites and areas within the study area. A dispersed use site is an area that is clearly defined by its size and often has a clear access point. A dispersed use area often contains many sites where differentiation between one site or another is not possible. One factor affecting the dispersed use sites in the study area is variable pool levels. Many of the dispersed sites have use areas below full pool. Consequently, at full pool, some of these sites are not usable. Alternatively, at lower pool levels, the distance to the water is longer and thus discourages use. These sites and areas have been mapped and are shown in Figures 4.2-1 and 4.2-2. Dispersed use sites and areas are important to visitors because they provide users with access to recreation areas and do not require payment of user fees.

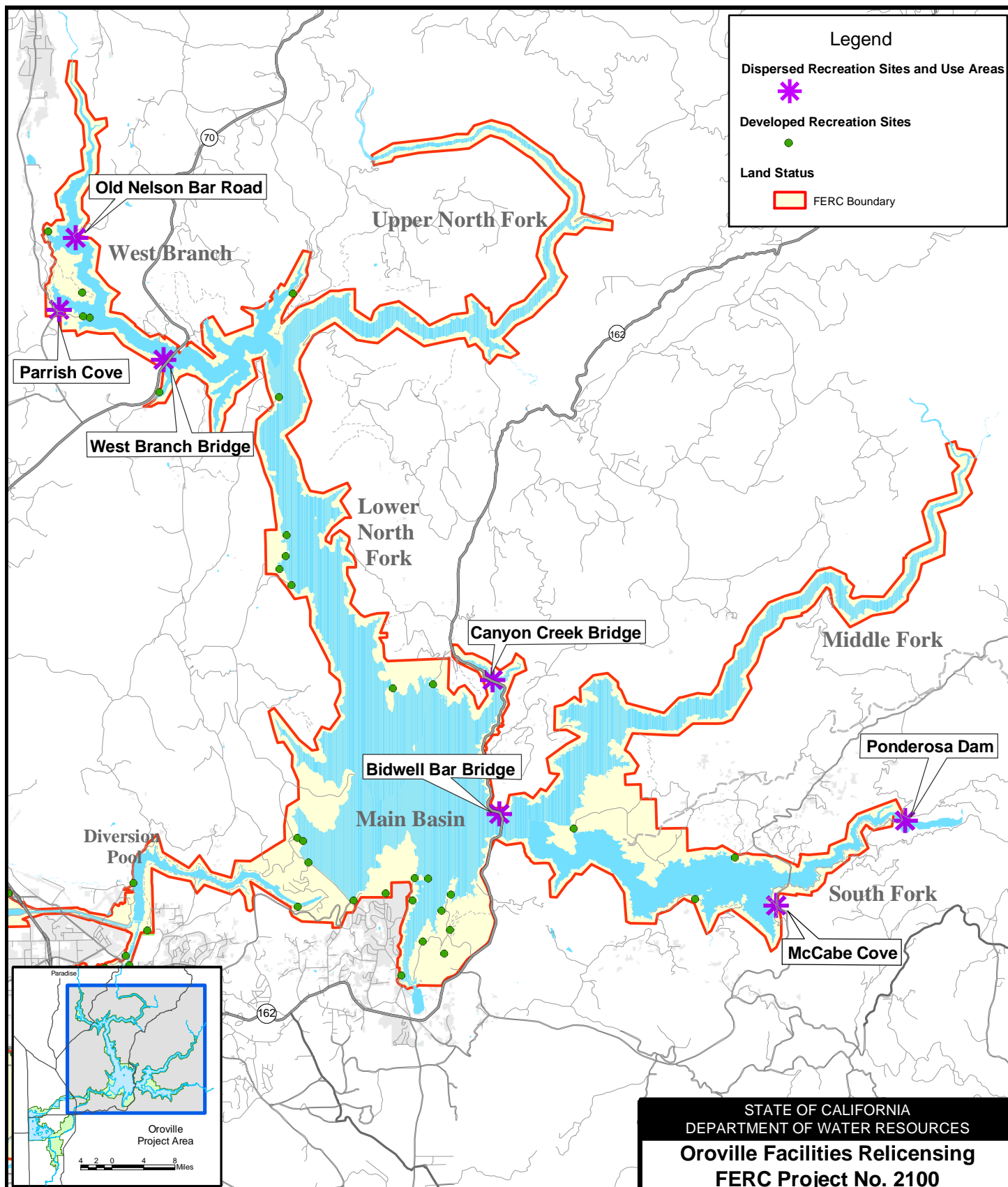
### **4.2.1 Lake Oroville Dispersed Sites and Areas**

There are seven significant dispersed use sites at Lake Oroville. Many of these sites are adjacent to Project area bridges. All of these sites were identified as a part of this study with the assistance of California Department of Parks and Recreation (DPR) and DWR staff. Figure 4.2-1 shows the location of the dispersed sites within the study area.

- € **Old Nelson Bar Road Dispersed Site** is on the old Nelson Bar Road located across the West Branch portion of Lake Oroville from Nelson Bar Car-top Boat Ramp (BR). The site varies in size depending upon pool level. The site receives shoreline use, and OHV use is apparent at lower pool levels. The site was also visited at full pool, when most of the site was submerged.
- € **Parrish Cove Dispersed Site** is located near the Lime Saddle Area. The area is accessed by parking in a gravel lot on the east side of Pentz-Durham Road just north of the access road leading to the Lime Saddle BR and DUA. The site is accessed by going under the flume on the north side of the parking lot. The site receives shoreline use including swimming. At lower pool levels, the site becomes less usable for shoreline users as the swim area becomes smaller and the distance to the water increases.

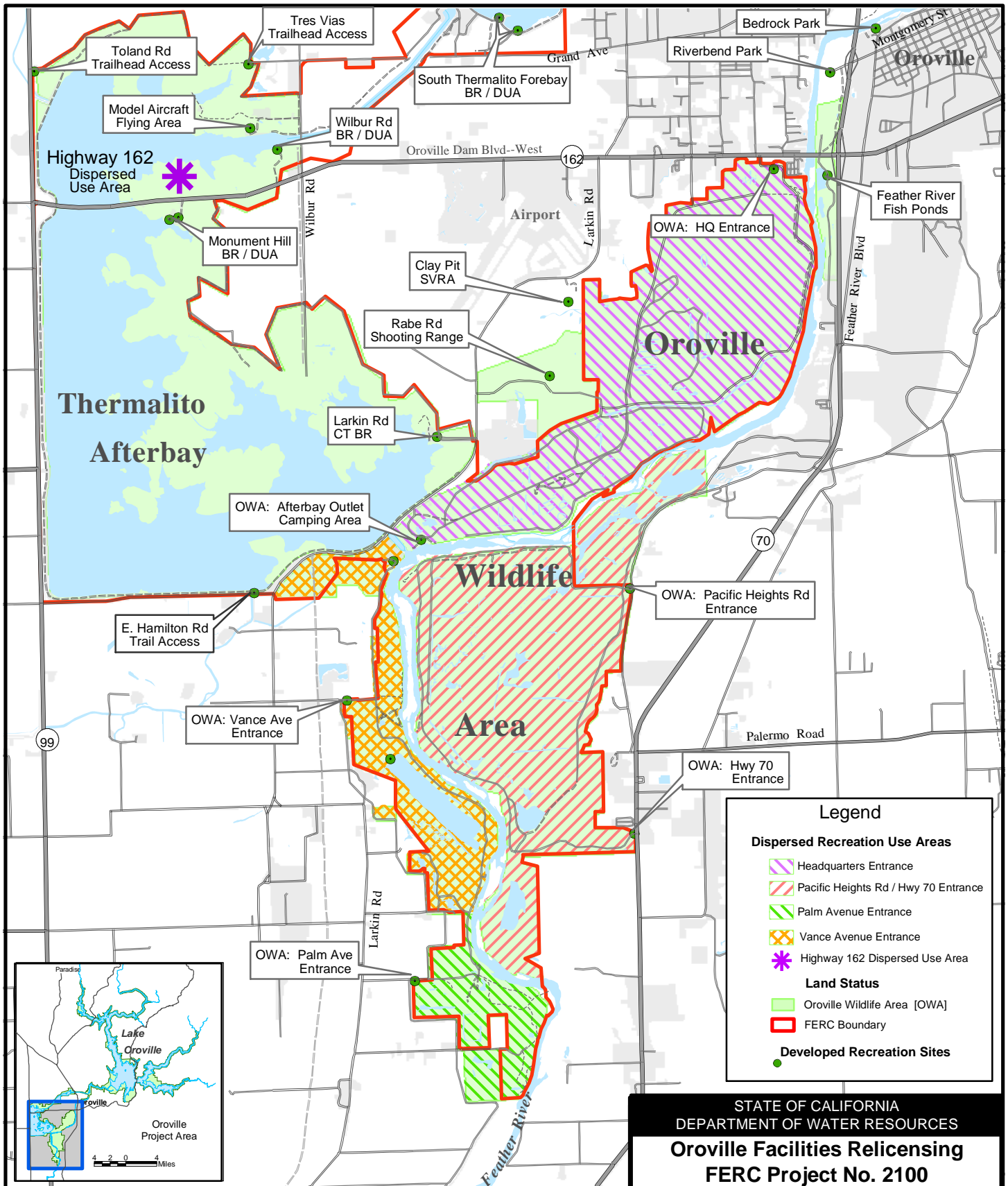
**Figure 4.2-1. Lake Oroville Dispersed Recreation Sites and Use Areas**

8.5 x 11 insert



**Figure 4.2-2. Lower Project Area Dispersed Recreation Use Areas**

8.5 x 11 insert



STATE OF CALIFORNIA  
DEPARTMENT OF WATER RESOURCES  
**Oroville Facilities Relicensing  
FERC Project No. 2100**

Figure 4.2-2  
(R-11)

**Lower Project Area  
Dispersed Recreation Use Areas**

Prepared by:  
PJ -- EDAW, Inc.

Date  
1/22/04

P:\2000\0s016.gis\arcmap\mp\_owa\_zone\_8.5x11.mxd

- € **West Branch Bridge Dispersed Site** is located on the west side of the Highway 70 bridge. There is a small area that allows for parking about 200 yards west of the bridge on the north side of the highway. The site is accessed by walking down a barricaded road to the shoreline. An outcropping of limestone is used by swimmers to jump into the water at certain pool levels.
- € **Canyon Creek Bridge Dispersed Site** is located on the west side of the Canyon Creek Bridge on Highway 162. There is a small parking area on the north side of the highway about 100 yards beyond the bridge. Access to the shoreline is along several steep, user-defined trails. Shoreline use, including fishing and swimming, occur at this site.
- € **Bidwell Bar Bridge Dispersed Site** is located on Highway 162 on the north side of the bridge. A relatively large parking area is located on the west side of the highway. An old road can be followed (on foot) from the north side of the parking lot down to the water, where shoreline use is possible at most times, depending upon pool level.
- € **Ponderosa Dam Dispersed Site** is located near the Ponderosa Dam at the farthest eastern extent of the South Fork of Lake Oroville. This site is accessed via a steep gravel road, Ponderosa Way, off of Lumpkin Road, then cross Ponderosa Dam and drive west until the road is no longer passable. At this point, the Lake Oroville shoreline is accessed by walking down the road.
- € **McCabe Cove Dispersed Site** is located off of Lumpkin Road about ½ mile south of the Enterprise Bridge. A road (sometimes gated) leads west of Lumpkin Road and provides shoreline access.

#### **4.2.2 Dispersed Sites At Thermalito Reservoirs**

Only one dispersed site, identified as the Highway 162 Dispersed Site, was surveyed among the Thermalito Complex reservoirs. This site provides dispersed recreation access to Thermalito Afterbay, north of Monument Hill. All other Thermalito sites are discussed among the developed recreation sites (also see Study R-10).

- € **Highway 162 Dispersed Site** is located across Highway 162 from the Monument Hill BR and DUA. The dispersed use area is large, and there are several access roads to shoreline sites and “unofficial” boat launches. Substantial OHV use, which is prohibited, appears to occur in this area.

#### **4.2.3 Oroville Wildlife Area (OWA) Dispersed Use Areas**

The OWA has a substantial number of dispersed use sites and areas. A large portion of the shoreline area along the Feather River receives dispersed public recreation use. To efficiently and effectively classify these sites, the OWA was divided into four dispersed use area zones based upon their proximity to entrances (Figure 4.2-2). Dispersed use activities in the OWA primarily include fishing, primitive camping, hiking, and wildlife viewing.

- ⌘ **Headquarters Entrance Dispersed Use Area** covers the OWA on the west side of the Feather River north of the Afterbay Outlet.
- ⌘ **Pacific Heights Road/Highway 70 Entrances Dispersed Use Area** covers the OWA on the east side of the Feather River.
- ⌘ **Vance Avenue Entrance Dispersed Use Area** is along the west side of the Feather River, south of the Afterbay Outlet, but north of a narrow portion of the OWA that separates this area from the Palm Avenue Entrance Dispersed Use Area.
- ⌘ **Palm Avenue Entrance Dispersed Use Area** covers the southernmost portion of the OWA along the west side of the Feather River. This area includes and is separated from other portions of the OWA by a narrow strip of the OWA along the Feather River (Figure 4.2-2).

#### **4.3 DEVELOPMENT OF SITE ASSESSMENT FORMS**

Site assessment forms were developed to evaluate the following potential impacts at recreation sites within the study area. A separate form was developed to assess impacts in shoreline zones. The site assessment forms can be found in Appendix A.

The following indicators were analyzed to evaluate potential recreation and public use impacts on ecological resources:

- |                                      |  |
|--------------------------------------|--|
| ⌘ Soil erosion;                      | ⌘ Impacts to wetlands;                                 |
| ⌘ Soil compaction;                   | ⌘ Impacts to riparian zones;                           |
| ⌘ Fugitive dust;                     | ⌘ Prevalence of downed wood;                           |
| ⌘ Trash accumulation;                | ⌘ Impacts to shoreline and water quality;              |
| ⌘ Sanitation;                        | ⌘ OHV impacts (evaluated at dispersed sites); and      |
| ⌘ Vegetation damage;                 | ⌘ Estimated use levels (evaluated at dispersed sites). |
| ⌘ Prevalence of user-defined trails; |  |



This study did not assess public use and recreation impacts to cultural resources, as the location of such sites is confidential. However, recreation use in the vicinity of sensitive cultural resource areas is addressed in other relicensing studies.

#### **4.4 CONDUCT FIELD WORK**

Researchers qualitatively observed study area sites and areas by walking and driving through the sites, looking for recreation- and public use-related impacts. The results were recorded on assessment forms (Appendix A).

##### **4.4.1 Site Observations and Field Assessments**

To assess ecological impacts, each recreation site and area was visited, and observed impacts were identified and noted, primarily in a qualitative fashion. Observations occurred in late February (winter observation) and July (summer observation). Site visits occurred at these two times to evaluate the potential for recovery at a site when recreation use was minimal. This schedule allowed the sites to be observed at different pool levels. The pool level during the winter observation was just over 800 feet above msl. The summer observation took place while the reservoir was about 885 feet above msl, within approximately 15 feet of full pool.

During site observations, impact assessment forms (Appendix A) were filled out and photographs were taken to document site conditions. Representative photos of impacted sites and areas are included in Appendix B. Site observations and assessments were completed both by driving and walking through each site or area.

Evaluations of ecological impacts at each site were based on a qualitative evaluation system that was assigned to each impact indicator. The impact indicators were evaluated in the following manner:

- € **Soil Erosion** - is erosion observed and readily apparent?
- € **Soil Compaction** - is soil compaction observed and evident?
- € **Fugitive Dust Noticeable** – is there observed dirt or fugitive dust from vehicles/people/bicycles/horses and on the trees/shrubs (particularly from unpaved roads)?
- € **Trash Accumulation** – is trash accumulation apparent at the site or area?
- € **Sanitation** - does the site have readily apparent sanitation problems related to the use or non-use of toilets?
- € **Vegetation Damage** - are there broken limbs or gashes on the trees and shrubs? Is there vegetation loss?
- € **Prevalence of User-Defined Trails** – do they exist at the site and how extensive are they?

- € **Impacts to Wetlands** - is the site near a wetland area and were impacts observed? (a review of GIS vegetation maps was also used to verify results)
- € **Impacts to Riparian Zones** - is the site near a riparian zone and were impacts observed? (a review of GIS vegetation maps was also used to verify results)
- € **Lack of Downed Wood** - is there accumulated downed wood on the ground (diameter greater than 3 inches)?
- € **Impacts to Shoreline and Water Quality** – is turbidity noticeable? Is there a sheen (from oil) noticeable on the water?
- € **OHV Impacts (Evaluated at dispersed sites)** - is there evidence of OHV impacts?
- € **Estimated Use Levels (Evaluated at dispersed sites)** – What is the estimated overall level of use based on the extent of bare ground, vegetation damage, erosion, and other indicators?

Additional information about water quality is addressed in the relicensing study W3 – Recreation Facilities and Operations Effects on Water Quality.

#### **4.4.2 Description of Indicators**

This section describes the impact indicators used to assess recreation and public use impact at developed and dispersed recreation sites and areas.

##### ***4.4.2.1 Lack of Downed Wood***

Wood collection for firewood can deplete an area of ecologically valuable downed wood. Downed wood may provide wildlife habitat as well as nutrients for soil as it decays. Pieces of wood greater than 3 inches diameter usually provide the most significant benefits. Conversely, a lot of downed wood in the vicinity of recreation sites can be a fire hazard.

##### ***4.4.2.2 Presence of Fugitive Dust***

Fugitive dust is dust or dirt that has blown into the air and may settle on trees or shrubs leaves and branches. This may inhibit a tree or shrubs ability to complete transpiration. Such dust can also contribute to diminished air quality standards, especially as they relate to particulate matter. Fugitive dust is often a concern near gravel roads, particularly during the dry season. Winter and spring usually allow for ecological recovery as dust and dirt is washed off the trees and shrubs.

##### ***4.4.2.3 OHV Use Impacts (Evaluated at Dispersed Sites)***

OHV impacts include compacted soil, erosion, and damaged vegetation. It is important to identify areas that receive OHV use, as these areas may receive significant impacts.

Tires can hasten vegetation loss and cause erosion, and the weight of an OHV can significantly compact soil. OHV impacts are of special concern near shoreline and wetland areas.

#### ***4.4.2.4 Proximity of Use to Riparian Zones***

Due to the sensitive ecological components of riparian vegetation, documenting site use in proximity to riparian areas is important. Similar to the presence of wetlands, the presence of a riparian area was based on GIS data as well as field observations of the status of riparian vegetation indicator species.

#### ***4.4.2.5 Proximity of Use to Wetlands***

Documenting sites that are in proximity to seasonal or permanent wetlands is important due to their sensitive ecological components. The presence of a wetland was based on GIS data and field observations of the occurrence of wetland vegetation indicator species at the sites. All field-based judgments regarding proximity to wetlands were compared with wetland vegetation maps for verification. Impacts to wetlands include trampling, which may damage vegetation and organic layers, and degraded surface water quality.

#### ***4.4.2.6 Lack of Sanitation***

Sanitation problems at recreation sites and areas are most frequently focused on the improper disposal of human waste. Although toilets are often provided at developed recreation sites, visitors may occasionally choose their own site when these facilities are closed, not properly maintained, or are too far away. In addition to signaling potential high use levels, sanitation problems can also become a health problem to visitors and water quality. Additionally, sanitation problems may be related to unclean toilet buildings.

#### ***4.4.2.7 Shoreline and Water Quality***

Shoreline and water quality impacts include erosion near the water, trash in the water and along the shore, and an oil sheen caused by motor boating. These impacts may reduce water quality, including increased turbidity and reduced dissolved oxygen.

#### ***4.4.2.8 Soil Compaction***

Soil compaction occurs when soil is compressed, causing an increase in soil density that often decreases the ability of the soil to absorb water. Soil compaction is often caused by heavy trampling or by vehicular use. Site recovery from soil compaction can occur in the off season as frost, rain, or non-use may allow for soil density to decrease.

Both soil erosion and compaction can expose tree roots. Once again, a certain level of soil compaction is inevitable at recreation sites, but monitoring sites can help ensure that compacted areas do not become too large. Soil compaction can often contribute to erosion.

#### **4.4.2.9 Soil Erosion**

Soil erosion occurs when there is a loss of soil, most often caused by a loss of stabilizing organic material. Erosion is often caused by wind or water; however, recreational activities may increase erosion by removing vegetation that stabilizes the soil. Soil erosion is important to document since eroded soil will not “recover” during the low use season, though vegetation growth in the off season can stabilize zones affected by erosion. Some erosion at developed sites is inevitable as water runs off of hardened surfaces (such as paved roads). The most serious concern regarding erosion is the formation of gullies that may spread and cause an area to lose progressively larger amounts of valuable topsoil. Although developed recreation sites are generally hardened (gravel and/or paving of roads and use areas), some areas of bare ground and erosion are often found near picnic tables, fire rings, user-defined trails, and shoreline areas (Hammit and Cole 1998).

#### **4.4.2.10 Trash Accumulation**

Trash accumulation can lead to both visual and environmental impact. It can be an issue at recreation sites where trash becomes unsightly and impacts visitor experience. Additionally, trash can impact wildlife and water quality if it is near the shoreline. The presence of litter at recreation sites may result from a lack of trash receptacles, an inadequate maintenance program, or a lack of visitor education.

#### **4.4.2.11 Creation of User-Defined Trails**

Visitors often create undeveloped side trails at recreation sites to connect existing elements of the site or to access areas adjacent to the site. The number and condition of side trails can indicate that trails should be hardened or defined. Vegetation loss and erosion may result from the creation of informal, user-defined side trails. User-defined trails are often created by visitors at dispersed undeveloped recreation sites to access a river or reservoir shoreline, or to access other use areas adjacent to the site. In general, user-defined trails can be acceptable at recreation sites if their impact is minimal.

#### **4.4.2.12 Vegetation Damage**

Damage to trees and vegetation is common at recreation sites. Examples of vegetation damage include recreation use that significantly exposes roots, or results in broken branches and limbs. Recovery of trees and shrubs may take several years; therefore,

recovery in the off-season can usually not be observed. Some impact at developed sites is acceptable, yet measures such as mulching around the roots and educating visitors about impacts can be effective at reducing impacts to trees.

#### **4.5 OVERALL ASSESSMENT OF RECREATION AND PUBLIC USE IMPACTS**

This section defines the methods used to identify public use impacts by indicator type and recreation site or area.

##### **4.5.1 Identify Overall Assessment of Public Use Impact by Indicator Type**

For each indicator, results of the field data collection were analyzed to determine an overall assessment of impact by indicator type for developed and dispersed recreation sites and areas. Indicators were classified into the following categories for both developed and dispersed sites:

- ⊄ **Low or No Concern** – If there were few or negligible concerns related to this indicator.
- ⊄ **Moderate Concern** – If the indicator was identified as having a moderate level of impact at several Project recreation sites or areas.
- ⊄ **High Concern** – If the indicator was identified as having a significant level of impact at several Project recreation sites or areas.
- ⊄ **Extreme Concern** – If the indicator was identified as having an extreme level of impact at several Project recreation sites and areas.

If an indicator is not identified as a moderate, high, or extreme concern at a significant number of the sites, it still may be an isolated, site-specific concern.

##### **4.5.2 Identify Overall Assessment of Public Use Impact by Recreation Site**

For all sites surveyed, results of the field data collection were analyzed to determine an overall assessment of impact at developed and dispersed recreation sites and areas. Similar to indicators, recreation sites and areas were classified into the following categories:

- ⊄ **Low or No Concern** – Recreation site or area did not present significant concerns related to recreation and public use impact.
- ⊄ **Moderate Concern** – Recreation site or area did have a few indicators with moderate levels of impact.
- ⊄ **High Concern** – Recreation site or area did have a few indicators with significant levels of impact.
- ⊄ **Extreme Concern** – Recreation site or area did have a few indicators with extreme levels of impact.

#### 4.6 ASSESS RECREATION AND PUBLIC USE IMPACT AT PROJECT TRAILS

Trails are unique features within the study area, owing to their linear nature. As a result, recreation and public use impacts tend to be linear as well. The following trails were surveyed by foot:

- € Brad Freeman Trail;
- € Dan Beebe Trail;
- € Lime Saddle Trail Loop; and
- € Loafer Creek Loop and Roy Rogers Trail.

These trails were evaluated slightly differently than developed and dispersed recreation sites and use areas, as impact patterns on trails are generally different than they are in developed and dispersed sites. The following indicators were assessed at study area trails:

- € **Soil Erosion** - is erosion readily apparent due to trail use?
- € **Trash Accumulation** – is trash apparent along the trail?
- € **Sanitation** - does the trail corridor have readily apparent sanitation problems related to toilet use or non-use?
- € **Vegetation Damage** – along the trail, are there broken limbs or gashes on the trees and shrubs? Is there vegetation loss?
- € **Impacts to Wetlands** - is the trail near a wetland area and were impacts observed? (a review of GIS vegetation maps was also used to verify results)
- € **Impacts to Riparian Zones** - is the trail near a riparian zone and were impacts observed? (a review of GIS vegetation maps was also used to verify results)

Soil compaction was not assessed, as it is inevitable along trail corridors.

Trail-related indicators were classified into the same categories as were indicators at recreation sites and areas:

- € **Low Level of Impact** - There was no concern regarding this indicator.
- € **Moderate Level of Impact** – There was little concern regarding this indicator, but it may be a concern in the future and may need to be monitored.
- € **High Level of Impact** – There was clearly an impact being caused by recreation and public use.
- € **Extreme Level of Impact** – There was an extreme level of impact along the trail route.

## **5.0 STUDY RESULTS**

This section is organized to briefly present the results of the field work, followed by the overall public use impact results. These sections are followed by a review of the public use impact assessment at study area trails.

### **5.1 RESULTS OF FIELD WORK**

Field work was conducted in late February 2003 (winter observation) and again in July 2003 (summer observation). Conditions were compared between the two observation periods. As expected, public use impacts appeared to be less during the winter observation.

#### **5.1.1 Results of Site Observations and Field Assessments**

##### ***5.1.1.1 Winter Conditions***

In general, impacts at recreation sites were less in the winter, as relatively low use and seasonal rain allows for certain indicators to recover. One factor noted during the winter observation was erosion not directly related to recreation use; this was erosion within the reservoir's inundation zone that is common during windy and rainy periods. Since these areas were below full pool, there was no vegetation to stabilize the soil and erosion was widespread.

##### ***5.1.1.2 Summer Conditions***

In general, public use impact was greater during the summer compared to the winter observation. The most evident impact was by the amount of trash accumulation at many area sites. Regardless, the majority of sites had only evidence of low or moderate levels of impacts. Also, rehabilitation efforts such as mulching around roots of existing trees were noted at area recreation sites. In addition, researchers observed staff cleaning and maintaining sites while site observations were taking place.

The reservoir was very close to full pool during the summer observation, and many of the sites appeared significantly different than they were in the winter. In fact, many of the observed impacts from the winter data collection period were inundated during the summer observation period. Conversely, certain potential shoreline impacts only appeared while the reservoir was closer to full pool; in many of these cases, this was because the water was closer to the recreation sites.

## **5.2 OVERALL ASSESSMENT OF PUBLIC USE IMPACTS**

This section first discusses public use impacts by indicator type at developed and dispersed recreation sites and areas. Then, a summary of results about overall public use impacts at developed and dispersed recreation sites and areas are included.

### **5.2.1 Overall Public Use Impacts by Indicator Type**

This section presents overall public use impact observations by indicator type for developed and dispersed recreation sites and areas. An indicator is noted at a site-specific level only; if that indicator is noted at several recreation sites or areas, it may be assumed to be a Project-wide impact. Therefore, it is possible that an individual site may have high concerns in relation to an indicator, but the same indicator may be only of low or moderate concern Project-wide.

#### ***5.2.1.1 Developed Recreation Sites***

This section summarizes study area concerns at developed recreation sites by indicator type. First, the Project-wide level of concern is listed and then each indicator is discussed in further detail below. There were no indicators identified at developed recreation sites as being of extreme or high concern. Additional site-specific data are provided in Section 5.2.2.

#### **Indicators of Extreme Concern**

Overall, there were no indicators at developed sites that were determined to be of extreme concern throughout the study area.

#### **Indicators of High Concern**

Overall, there were no indicators at developed recreation sites that were determined to be of high concern in the study area.

#### **Indicators of Moderate Concern**

Overall, the following indicators were determined to be of moderate concern at developed recreation sites Project-wide:

- ∅ Soil compaction;
- ∅ Soil erosion;
- ∅ Trash accumulation;
- ∅ User-defined trails; and
- ∅ Water quality /shoreline impacts.



### **Indicators of Little or No Concern**

Overall, the following indicators are of little or no concern at developed recreation sites Project-wide:

- ∄ Downed wood;
- ∄ Fugitive dust;
- ∄ Riparian impacts;
- ∄ Sanitation;
- ∄ Vegetation damage; and
- ∄ Wetland impacts.

### **Discussion of Indicators of Moderate Concern (Project-Wide) at Developed Recreation Sites**

**Soil Compaction.** Soil compaction was a moderate concern at several sites. In addition, soil compaction was noted as a high concern at the Afterbay Outlet Campground and DUA, and Rabe Road Shooting Range. Additionally, it was noted as an extreme impact at the Clay Pit State Vehicle Recreation Area (SVRA).

**Soil Erosion.** Soil erosion was noted as a moderate concern at several developed recreation sites. Five sites were noted as having high concerns related to soil erosion including the Afterbay Outlet Campground and DUA, Clay Pit SVRA, Foreman Creek Car-top BR, Rabe Road Shooting Range, and Saddle Dam DUA.

**Trash Accumulation.** Trash accumulation was a moderate concern at several developed sites, particularly during the summer data collection period. However, it should be noted that crews were seen cleaning sites while the data collection was taking place. Common litter types at recreation sites include cans, bottles, cigarette butts, and fishing-related materials (e.g., bait containers, fishing line, bobbers). In general, there was very little trash accumulation at recreation sites during the winter data collection period, as use was lower and off-season site upkeep appeared very good. Some developed sites were noted as having some trash during the summer data collection; however, there are regular and well-organized clean-up efforts at developed sites. Trash accumulation was cited as an extreme impact at the Rabe Road Shooting Range (gun shells and other trash). Additionally, trash accumulation was noted as a high concern at the following developed recreation sites: Afterbay Outlet Campground and DUA, Foreman Creek Car-top BR, and Saddle Dam DUA.

**User-Defined Trails.** The prevalence of user-defined trails at developed recreation sites was noted as a moderate concern. There were many sites with user-defined trails; however, they most often were used to access recreation area facilities such as restrooms or shoreline areas. The Saddle Dam DUA was noted as having high concern related to the prevalence of user-defined trails. The Clay Pit SVRA had extensive user-defined trails, mostly from OHV use.

**Shoreline and Water Quality.** Shoreline and water quality impacts include erosion near the water, trash in the water and along the shore, and an oil sheen caused by motor boating. Water and shoreline impact were noted as a moderate concern at several recreation sites, primarily related to erosion close the shoreline and sites in proximity to sensitive species (noted from GIS mapping). An oil sheen along the water was not noted at any of the developed recreation sites.

#### **Discussion of Indicators of Little or No Concern (Project-Wide) at Developed Recreation Sites**

**Downed Wood.** A lack of downed wood was not identified as an impact at any developed recreation sites. Fires are carefully controlled in the study area.

**Fugitive Dust.** The presence of fugitive dust in the trees and shrubs was not noted during the winter observation period. This condition was noted at Foreman Creek Car-top BR during the summer data collection period.

**Riparian Zones.** Public use impacts within riparian zones were noted as an issue of little or no concern Project-wide. However moderate concerns were noted at a few developed recreation sites as their facilities were in proximity to sensitive riparian resources (confirmed by pedestrian surveys and vegetation mapping). These sites include the Afterbay Outlet Campground and DUA, and the Wilbur Road BR (Thermalito Afterbay).

**Sanitation.** Impacts related to poor sanitation were not identified as a Project-wide concern at developed recreation sites.

**Vegetation Damage.** Vegetation damage was not noted as a Project-wide concern. In fact, it was noted that soil and mulch were spread around the roots of many trees at developed sites. However, moderate impacts were noted near the Afterbay Outlet and Stringtown Car-top BR.

**Wetland Impacts.** Project-wide public use impacts to wetlands were not identified at developed recreation areas in the study area. However a few sites are in proximity to wetlands, particularly within the OWA, including the Larkin Road DUA/BR and the Wilbur Road BR (Thermalito Afterbay). This was confirmed by checking mapped GIS vegetation data.

#### ***5.2.1.2 Dispersed Recreation Sites and Use Areas***

This section summarizes Project-wide concerns at dispersed recreation sites and use areas by indicator type. Additional discussion of each indicator is included below. Trash accumulation, OHV impact, and user-defined trails were identified as high

concerns at dispersed use sites and use areas (Project-wide). However, there were no dispersed sites or areas identified as being of extreme concern.

### **Indicators of Extreme Concern**

Overall, there were no indicators at dispersed sites and areas that were determined to be of extreme concern, Project-wide.

### **Indicators of High Concern**

Overall, the following indicators are of high concern at dispersed sites and areas, Project-wide:

- ⊘ OHV impact;
- ⊘ Trash accumulation; and
- ⊘ User-defined trails.

### **Indicators of Moderate Concern**

Overall, the following indicators are of moderate concern at study area dispersed sites and areas, Project-wide:

- ⊘ Soil compaction;
- ⊘ Soil erosion;
- ⊘ Vegetation damage;
- ⊘ Water/shoreline issues;
- ⊘ Riparian issues; and
- ⊘ Wetlands.

### **Indicators of Little or No Concern**

Overall, the following indicators are of little or no concern at study area developed recreation sites, Project-wide:

- ⊘ Downed wood;
- ⊘ Fugitive dust; and
- ⊘ Sanitation issues.

### **Discussion of Indicators of High Concern at Dispersed Recreation Sites and Areas**

**OHV Impacts.** Impacts related to OHV use are of high concern at dispersed use sites and areas, especially within the OWA. OHV impacts are of special concern near shoreline and wetland areas. High impacts related to OHV use were noted at all OWA dispersed use areas, the Highway 162 Dispersed Site, and the Old Nelson Bar Road Dispersed Site. The OWA and Highway 162 sites (technically part of the OWA) are especially noteworthy, given that OHV use is prohibited.

**Trash Accumulation.** Trash accumulation was identified as a high or extreme concern at many dispersed recreation sites and areas. It appears that trash pick-up does not occur regularly at many dispersed use sites and areas. In fact, trash accumulation was noted as at least a moderate concern at all dispersed sites or areas.

**User Defined Trails.** The prevalence of user-defined trails is a high concern Project-wide at dispersed recreation sites and areas. Many of these trails are in steep areas as they often access the water at Lake Oroville. Additionally, since most dispersed areas do not have formalized trails, almost all of the trails are user-defined. User-defined trails were noted as having high impacts at the OWA Headquarters and Pacific Heights Road/Highway 70 Entrances.

### **Discussion of Indicators of Moderate Concern at Dispersed Recreation Sites and Areas**

**Soil Compaction.** Soil compaction was identified as an indicator of moderate concern at dispersed recreation sites, Project-wide. A moderate level of concern related to soil compaction was noted at almost all dispersed use sites and areas.

**Soil Erosion.** Impacts related to soil erosion were identified as being of moderate concern at Project dispersed recreation sites and areas. Many of the dispersed use sites and areas occur near water bodies, and erosion is apparent at many of these sites. This may lead to potentially increased turbidity at study area water bodies. High impacts related to soil erosion were noted at the Old Nelson Bar Road Dispersed Site and the Ponderosa Dam Dispersed Site. Several other dispersed sites had moderate concerns related to soil erosion.

**Shoreline and Water Quality.** Shoreline and water quality concerns were noted as moderate concerns at dispersed use sites and areas, Project-wide. Shoreline and water quality concerns include erosion near the water, and trash in the water and along the shore. High impacts were noted at the OWA Headquarters and Pacific Heights Road/Highway 70 Entrances.

**Riparian Zones.** Impacts in riparian zone are of moderate concern at four dispersed sites and areas in the study area. All field-based judgments regarding proximity to riparian areas were compared with vegetation maps for verification.

**Vegetation Damage.** Vegetation damage was noted as a moderate concern at dispersed recreation sites and areas. However, high concerns were identified at the OWA Headquarters Entrance Dispersed Use Area. Moderate concerns were noted at the other dispersed use areas in the OWA as well. Impacts to vegetation most commonly included broken tree limbs and exposed roots.

**Wetlands.** Wetland impacts were noted as a moderate concern at dispersed use areas within the OWA and at the Highway 162 Dispersed Use Site. All field-based judgments regarding proximity to wetland areas were compared with vegetation maps for verification. Impacts to wetlands include scattered trampling or damage to potentially sensitive vegetation.

### **Discussion of Indicators of Little or No Concern at Dispersed Recreation Sites**

**Downed Wood.** A lack of downed wood was not noted as an issue at dispersed recreation sites and areas.

**Fugitive Dust.** Fugitive dust is not a concern at most sites. It was a moderate concern, however, during the summer observation period at three OWA Entrance dispersed use areas. The fugitive dust is only an issue there during the dry (summer) season.

**Sanitation.** There were no observed public use concerns related to sanitation at dispersed recreation sites and areas.

### **5.2.2 Overall Assessment of Recreation and Public Use Impact by Recreation Site and Use Area**

In this section, developed and dispersed sites are classified into the following categories including: extreme concern, high concern, moderate concern, and little or no concern. Then, recreation sites and areas that had some concern are discussed in further detail.

In general, study area developed recreation sites are in good condition and have limited ecological concerns caused by recreation and public use. However, there were several sites identified as being of high concern, primarily sites and areas within and near the OWA.

#### **5.2.2.1 Developed Recreation Sites**

This section details the results of public use impacts at specific developed recreation sites within the study area. Tables 5.2-1, 5.2-2, and 5.2-3, and Figure 5.2-1 summarize these concerns.

#### **Developed Recreation Sites of Extreme Concern**

There were no developed recreation sites or areas identified as being of extreme concern.

#### **Developed Recreation Sites of High Concern**

The following developed recreation sites were identified as being of high concern (Table 5.2-1 and Figure 5.2-1):

- ∄ Afterbay Outlet Campground and DUA;
- ∄ Clay Pit SVRA;
- ∄ Foreman Creek Car-top BR;
- ∄ Rabe Road Shooting Range; and
- ∄ Saddle Dam DUA.

### **Developed Recreation Sites of Moderate Concern**

The following developed recreation sites were identified as being of moderate concern (see Table 5.2-2):

- ∄ Bloomer Cove Area BIC;
- ∄ Craig Saddle BIC;
- ∄ Enterprise BR;
- ∄ Goat Ranch BIC;
- ∄ Larkin Road DUA and BR (Thermalito Afterbay);
- ∄ Stringtown Car-top BR;
- ∄ Vinton Gulch Car-top BR; and
- ∄ Wilbur Road BR (Thermalito Afterbay).

### **Developed Recreation Sites of Little or No Concern**

The following developed recreation sites were identified as being of little or no concern (Table 5.2-3):

- ∄ Bidwell Canyon BR;
- ∄ Bidwell Canyon Campground;
- ∄ Bidwell Canyon DUA;
- ∄ Bidwell Canyon Marina;
- ∄ Dark Canyon Car-top BR;
- ∄ Diversion Pool DUA;
- ∄ Feather River Fish Hatchery;
- ∄ Foreman Creek BIC;
- ∄ Lake Oroville Visitors Center;
- ∄ Loafer Creek DUA;
- ∄ Loafer Creek Horse Campground;
- ∄ Loafer Creek Campground and Group Campground;
- ∄ Lime Saddle Campground and Group Campground;
- ∄ Lime Saddle BR and DUA;
- ∄ Loafer Creek BR;
- ∄ Model Aircraft Flying Area;
- ∄ Monument Hill DUA and BR;
- ∄ Nelson Bar Car-top BR;
- ∄ North Thermalito Forebay DUA and BR/Aquatic Center;

**Table 5.2-1. Recreation and Public Use Impacts at Developed Recreation Sites  
and Areas with High Concerns at the Oroville Facilities**

11 x 17 insert

**Table 5.2-1. Recreation and Public Use Impacts at Developed Recreation Sites and Areas with High Concerns at the Oroville Facilities.**

Recreation Site	Observation Period	Soil Erosion	Soil Compaction	Fugitive Dust	Trash Accumulation	Sanitation Issues	Vegetation Damage	User-Defined Trails	Wetland Impact	Riparian Impact	Downed wood	Water / Shoreline Impact	Overall Conclusion
Afterbay Outlet Campground and DUA	Winter	High	High	Low / No	Moderate	High	Moderate	Moderate	Low / No	Moderate	Low / No	Moderate	High
	Summer	High	High	Low / No	High	High	Moderate	Moderate	Low / No	Moderate	Low / No	Moderate	
	<b>Overall</b>	<b>High</b>	<b>High</b>	<b>Low / No</b>	<b>High</b>	<b>High</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Moderate</b>	
Clay Pit State Vehicular Recreation Area	Winter	High	Extreme	Low / No	Moderate	Low / No	Low / No	Extreme	Low / No	Low / No	Low / No	Low / No	High
	Summer	High	Extreme	Low / No	Extreme	Low / No	Low / No	Extreme	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>High</b>	<b>Extreme</b>	<b>Low / No</b>	<b>High</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Extreme</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
Foreman Creek Car-top BR	Winter	High	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	High	High
	Summer	High	Low / No	Moderate	High	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	High	
	<b>Overall</b>	<b>High</b>	<b>Low / No</b>	<b>Moderate</b>	<b>High</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>High</b>	
Rabe Road Shooting Range	Winter	High	High	Low / No	Extreme	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	High
	Summer	High	High	Low / No	Extreme	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>High</b>	<b>High</b>	<b>Low / No</b>	<b>Extreme</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
Saddle Dam DUA	Winter	High	Moderate	Low / No	High	Low / No	Low / No	High	Low / No	Low / No	Low / No	Low / No	High
	Summer	High	Moderate	Low / No	Moderate	Moderate	Low / No	High	Low / No	Low / No	Low / No	Moderate	
	<b>Overall</b>	<b>High</b>	<b>Moderate</b>	<b>Low / No</b>	<b>High</b>	<b>Moderate</b>	<b>Low / No</b>	<b>High</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	

Note: Rankings range from Low, to Moderate, to High, to Extreme.  
Source: EDAW Inc. (2003)



**Table 5.2-2. Recreation and Public Use Impacts at Developed Recreation Sites  
and Areas with Moderate Concerns at the Oroville Facilities**

11 x 17 insert (printed on back of Table 5.2-1)

**Table 5.2-2. Recreation and Public Use Impacts at Developed Recreation Sites and Areas with Moderate Concerns at Oroville Facilities.**

Recreation Site	Observation Period	Soil Erosion	Soil Compaction	Fugitive Dust	Trash Accumulation	Sanitation Issues	Vegetation Damage	User-Defined Trails	Wetland Impact	Riparian Impact	Downed wood	Water / Shoreline Impact	Overall Conclusion
Bloomer Cove Area BICs	Winter	Moderate	Moderate	Low / No	Moderate	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	<b>Moderate</b>
	Summer	Moderate	Moderate	Low / No	Moderate	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
Craig Saddle BIC	Winter	Moderate	Moderate	Low / No	Low / No	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	<b>Moderate</b>
	Summer	Moderate	Moderate	Low / No	Moderate	Moderate	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
Enterprise BR	Winter	Moderate	Moderate	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	<b>Moderate</b>
	Summer	Moderate	Moderate	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
Goat Ranch BIC	Winter	Moderate	Moderate	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	<b>Moderate</b>
	Summer	Moderate	Moderate	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
Larkin Road DUA and BR (Thermalito Afterbay)	Winter	Moderate	Moderate	Low / No	Moderate	Low / No	Low / No	Moderate	Moderate	Low / No	Low / No	Moderate	<b>Moderate</b>
	Summer	Moderate	Moderate	Low / No	Low / No	Low / No	Low / No	Moderate	Moderate	Low / No	Low / No	Moderate	
	<b>Overall</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	
Stingtown Car-top BR	Winter	Moderate	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Moderate	<b>Moderate</b>
	Summer	Moderate	Low / No	Low / No	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Moderate	
	<b>Overall</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	
Vinton Gulch Car-top BR	Winter	High	Moderate	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	<b>Moderate</b>
	Summer	High	Moderate	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>High</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
Wilbur Road BR (Thermalito Afterbay)	Winter	Moderate	Moderate	Low / No	Moderate	Moderate	Low / No	Low / No	Moderate	Moderate	Low / No	Moderate	<b>Moderate</b>
	Summer	Moderate	Moderate	Low / No	Low / No	Moderate	Low / No	Low / No	Moderate	Moderate	Low / No	Moderate	
	<b>Overall</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Moderate</b>	

*Note: Rankings range from Low, to Moderate, to High, to Extreme.  
Source: EDAW Inc. (2003)*

**Table 5.2-3. Recreation and Public Use Impacts at Developed Recreation Sites  
and Areas with Little or No Concerns at the Oroville Facilities**

11 x 17 insert (2 pages)

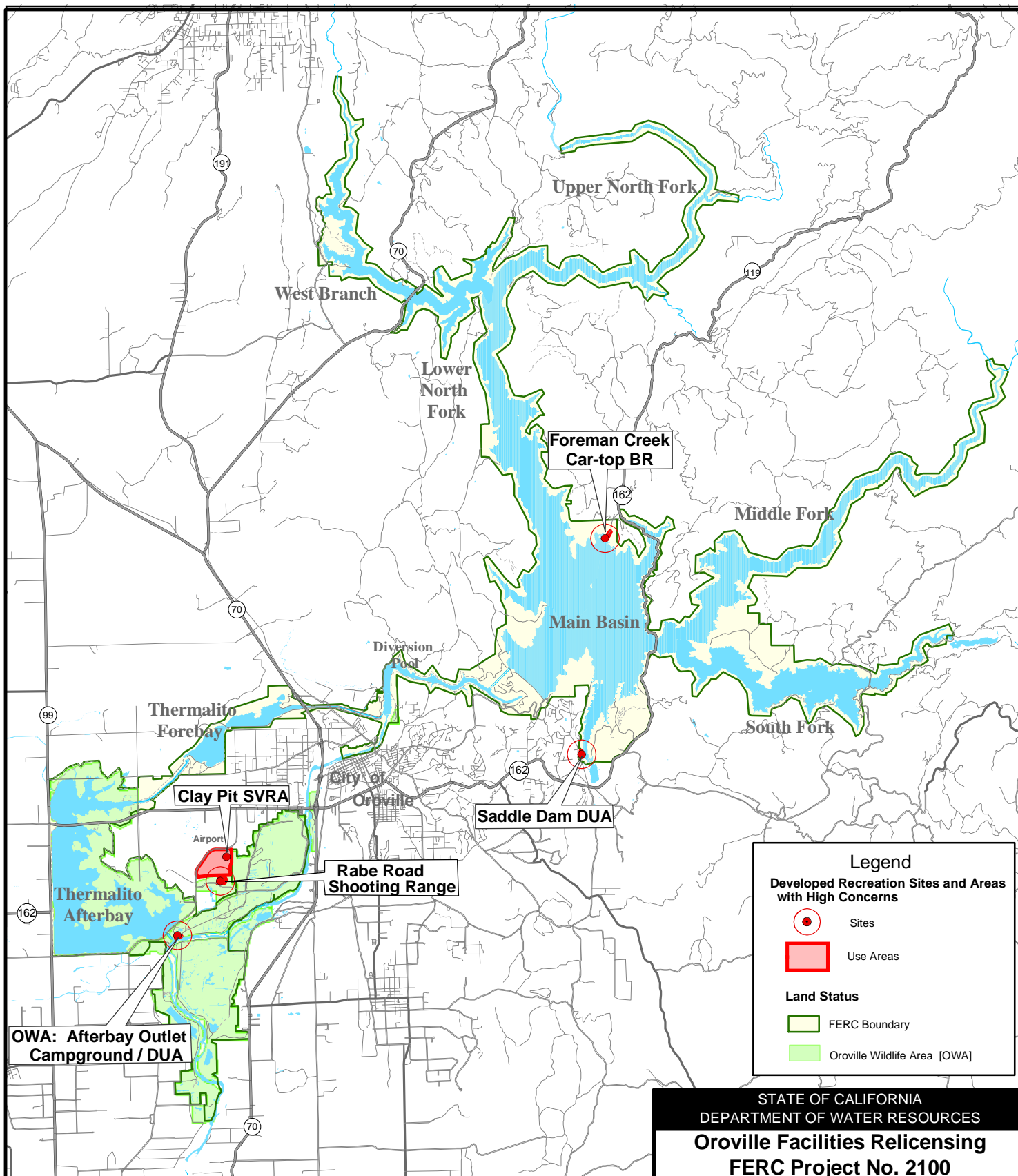
**Table 5.2-3. Recreation and Public Use Impacts at Developed Recreation Sites and Areas with Little or No Concerns at the Oroville Facilities.**

Recreation Site	Observation Period	Soil Erosion	Soil Compaction	Fugitive Dust	Trash Accumulation	Sanitation Issues	Vegetation Damage	User-Defined Trails	Wetland Impact	Riparian Impact	Downed wood	Water / Shoreline Impact	Overall Conclusion
Bidwell Canyon BR	Winter	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Moderate	Low / No	Low / No	Low
	Summer	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	
Bidwell Canyon Campground	Winter	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low
	Summer	Low / No	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
Bidwell Canyon Day Use Area	Winter	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low
	Summer	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
Bidwell Canyon Marina	Winter	Moderate	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low
	Summer	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
Dark Canyon Car-top BR	Winter	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low
	Summer	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
Diversion Pool DUA	Winter	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low
	Summer	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
Fish Hatchery	Winter	Low / No	Low / No	Low / No	Moderate	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low
	Summer	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
Foreman Creek BIC	Winter	Moderate	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Moderate	Low
	Summer	Moderate	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Moderate	
	<b>Overall</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	
Lake Oroville Visitors Center	Winter	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low
	Summer	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
Lime Saddle Campground and Group Campground	Winter	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low
	Summer	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
Lime Saddle BR and DUA	Winter	Moderate	Moderate	Low / No	Low / No	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low
	Summer	Moderate	Moderate	Low / No	Low / No	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
Loafer Creek BR	Winter	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low
	Summer	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	

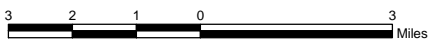
Back of Table 5.2-3

**Figure 5.2-1. Developed Recreation Sites and Areas with High Concerns**

8.5 x 11 insert



Source: DWR GIS / EDAW 2003



Scale 1 : 190,080  
1" = 3 miles

STATE OF CALIFORNIA  
DEPARTMENT OF WATER RESOURCES

## Oroville Facilities Relicensing FERC Project No. 2100

Figure 5.2-1  
(R-11)



Developed Recreation Sites and Areas  
with High Concerns

Prepared by: PJ -- EDAW, Inc. Date: 1/22/04 P:\2000\0s\016\gis\arcmap\imp\_imp\_recdev\_8.5x11.mxd

- € Oroville Dam Overlook DUA;
- € Riverbend Park;
- € South Thermalito Forebay DUA and BR; and
- € Spillway BR and DUA.

### **Discussion of Developed Recreation Sites and Areas of High Concern**

GIS mapping of developed recreation sites and use areas with high concerns are depicted in Figure 5.2-1 and discussed below by site.

**Afterbay Outlet Campground and DUA.** At this recreation site, high concerns for soil erosion and compaction were noted; these impacts were also noted near the shoreline. High concerns related to trash accumulation were also identified at this site.

**Clay Pit SVRA.** This site was identified as a recreation site with high concerns due to impacts related to OHV use.

**Foreman Creek Car-top BR.** This site was identified as a site with high concerns as soil erosion, trash accumulation, and water quality (noticeable turbidity) were identified. Some of these concerns were more pronounced during the winter observation period when the pool level was lower and more land area was exposed to erosion.

**Rabe Road Shooting Range.** This site was identified as having high concerns to soil, as well as having extreme amounts of trash accumulation. There were large amounts of gun shells on the ground during the two site observation periods. Site cleanup appears to occur sporadically.

**Saddle Dam DUA.** Three indicators were identified as having high concerns at this site: soil (primarily erosion and compaction), trash accumulation, and user-defined trails. This area has some of the characteristics of a dispersed use area as user-defined trails go in many directions; in addition, use along some of these trails has led to soil erosion.

### **Discussion of Developed Recreation Sites and Areas of Moderate Concern**

**Bloomer Cove Area BICs.** These collective sites were identified as having moderate concerns related to soil (erosion and compaction), trash accumulation, and the prevalence of user-defined trails.

**Craig Saddle BIC.** Several indicators were identified at this site as having moderate concerns, including soil erosion, soil compaction, trash accumulation, sanitation, and the prevalence of user-defined trails.

**Enterprise BR.** Three indicators were identified as having moderate concerns: soil erosion, soil compaction, and trash accumulation.



**Goat Ranch BIC.** Three indicators were identified as having moderate concerns: soil erosion, soil compaction, and trash accumulation.

**Larkin Road DUA and BR (Thermalito Afterbay).** Moderate concerns were noted at this site related to the following indicators: soil erosion, soil compaction, trash accumulation, prevalence of user-defined trails, wetland impact, and water/shoreline impact.

**Stringtown Car-top BR.** The following were identified as having moderate concerns at this site: soil erosion, trash accumulation, and vegetation damage.

**Vinton Gulch Car-top BR.** High concerns related to soil erosion were noted at this site. Additionally, moderate concerns related to soil compaction and trash accumulation were identified.

**Wilbur Road BR (Thermalito Afterbay).** Moderate impacts were noted at this site related to the following indicators: soil erosion, soil compaction, trash accumulation, sanitation issues, wetland impact, riparian impacts, and water/shoreline impact.

#### ***5.2.2.2 Dispersed Recreation Sites and Use Areas***

This section details the results of recreation and public use impacts at specific dispersed recreation sites and areas within the study area. Tables 5.2-4 and 5.2-5, as well as Figure 5.2-2, summarize these concerns.

##### **Dispersed Recreation Sites and Use Areas of Extreme Concern**

There were no dispersed recreation sites or use areas identified as being of extreme concern.

##### **Dispersed Recreation Sites and Use Areas of High Concern**

The following dispersed recreation sites were identified as being of high concern (Table 5.2-4):

- € Old Nelson Bar Road Dispersed Site;
- € OWA – Headquarters Entrance Dispersed Use Area;
- € OWA – Pacific Heights Road/Highway 70 Entrances Dispersed Use Area;
- € OWA – Palm Avenue Entrance Dispersed Use Area; and
- € Ponderosa Dam Dispersed Site.

##### **Dispersed Recreation Sites and Use Areas of Moderate Concern**

The following dispersed recreation sites were identified as being of moderate concern (see Table 5.2-5)

- € Bidwell Bar Bridge Dispersed Use Site;
- € Canyon Creek Bridge Dispersed Site;
- € McCabe Cove;
- € Highway 162 Dispersed Site;
- € OWA – Vance Avenue Entrance Dispersed Use Area;
- € Parrish Cove; and
- € West Branch Bridge Dispersed Site.

### **Dispersed Recreation Sites and Use Areas of Little or No Concern**

There were no dispersed recreation sites noted as being of little or no concern.

### **Discussion of Dispersed Recreation Sites and Areas of High Concern**

GIS mapping of dispersed recreation sites and use areas with high concern is depicted in Figure 5.2-2. These sites are discussed below.

**Old Nelson Bar Road Dispersed Site.** This site was observed during the winter observation period, but was inundated during the summer observation period. The site was noted to have high impacts related to soil erosion, trash accumulation, and OHV impacts. Additionally, the proximity of the erosion to the shoreline was also noted as a moderate impact.

**OWA – Headquarters Entrance Dispersed Use Area.** There were several issues related to recreation and public use impacts identified in this dispersed use area. Trash accumulation was identified as an extreme concern, as litter accumulation was apparent throughout the area. In addition, vegetation damage was apparent as a lack of vegetation, broken limbs, and exposed roots were noted. The prevalence of user-defined trails and OHV use were also noted as high concerns in this dispersed use area. Additionally, water and shoreline concerns were identified as high.

**Table 5.2-4. Recreation and Public Use Impact at Dispersed Recreation Sites and Use Areas with High Concern at Oroville Facilities**

11 x 17 insert

Table 5.2-4. Recreation and Public Use Impact at Dispersed Recreation Sites and Use Areas with High Concern at Oroville Facilities.

Recreation Site or Area	Observation	Soil Erosion	Soil Compaction	Fugitive Dust	Trash Accumulation	Sanitation Issues	Vegetation Damage	User-Defined Trails	OHV Impact	Wetland Impact	Riparian Impact	Downed wood	Water / Shoreline Impact	Overall Conclusion
Old Nelson Bar Road Dispersed Site <sup>1</sup>	Winter	High	Moderate	Low / No	High	Low / No	Low / No	Low / No	High	Low / No	Low / No	Low / No	Moderate	High
	Summer	NA <sup>1</sup>	NA <sup>1</sup>	NA <sup>1</sup>	NA <sup>1</sup>	NA <sup>1</sup>	NA <sup>1</sup>	NA <sup>1</sup>	NA <sup>1</sup>	NA <sup>1</sup>	NA <sup>1</sup>	NA <sup>1</sup>	NA <sup>1</sup>	
	Overall	High	Moderate	Low / No	High	Low / No	Low / No	Low / No	High	Low / No	Low / No	Low / No	Moderate	
OWA – Headquarters Entrance Dispersed Use Area	Winter	Low / No	Moderate	Low / No	Extreme	Low / No	High	High	High	Moderate	Moderate	Low / No	High	High
	Summer	Low / No	Moderate	Moderate	Extreme	Low / No	High	High	High	Moderate	Moderate	Low / No	High	
	Overall	Low / No	Moderate	Moderate	Extreme	Low / No	High	High	High	Moderate	Moderate	Low / No	High	
OWA – Pacific Heights Rd / Highway 70 Entrances Dispersed Use Area	Winter	Low / No	Low / No	Low / No	Moderate	Low / No	Moderate	High	High	Moderate	Moderate	Low / No	High	High
	Summer	Low / No	Low / No	Moderate	High	Low / No	Moderate	High	High	Moderate	Moderate	Low / No	High	
	Overall	Low / No	Low / No	Moderate	High	Low / No	Moderate	High	High	Moderate	Moderate	Low / No	High	
OWA – Palm Ave Entrance Dispersed Use Area	Winter	Low / No	Low / No	Low / No	Moderate	Low / No	Moderate	Moderate	High	Moderate	Moderate	Low / No	Moderate	High
	Summer	Low / No	Low / No	Moderate	High	Low / No	Moderate	Moderate	High	Moderate	Moderate	Low / No	Moderate	
	Overall	Low / No	Low / No	Moderate	High	Low / No	Moderate	Moderate	High	Moderate	Moderate	Low / No	Moderate	
Ponderosa Dam Dispersed Site	Winter	High	Moderate	Low / No	High	Low / No	Low / No	Low / No	High	Low / No	Low / No	Low / No	Moderate	High
	Summer	High	Moderate	Low / No	High	Low / No	Low / No	Low / No	High	Low / No	Low / No	Low / No	Moderate	
	Overall	High	Moderate	Low / No	High	Low / No	Low / No	Low / No	High	Low / No	Low / No	Low / No	Moderate	

<sup>1</sup>This site was inundated during the summer observation period and therefore was not evaluated.  
Note: Rankings range from Low, to Moderate, to High, to Extreme.  
Source: EDAW Inc. (2003)

**Table 5.2-5. Recreation and Public Use Impacts at Dispersed Recreation Sites  
and Use Areas with Moderate Concerns at the Oroville Facilities**

11 x 17 insert (printed on back of Table 5.2-4)

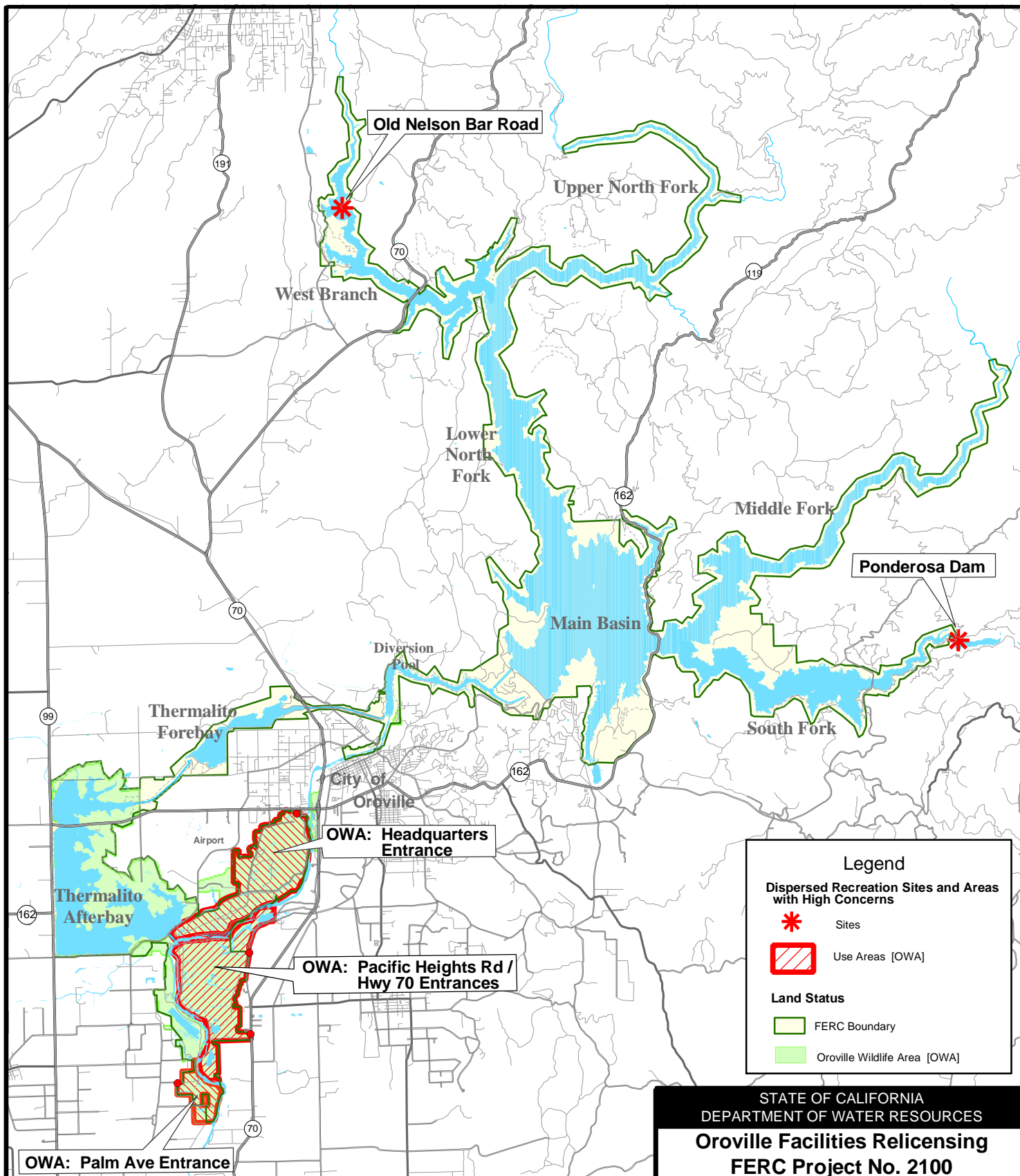
**Table 5.2-5. Recreation and Public Use Impacts at Dispersed Recreation Sites and Use Areas with Moderate Concerns at Oroville Facilities.**

Recreation Site or Area	Observation	Soil Erosion	Soil Compaction	Fugitive Dust	Trash Accumulation	Sanitation Issues	Vegetation Damage	User-Defined Trails	OHV Impact	Wetland Impact	Riparian Impact	Downed wood	Water / Shoreline Impact	Overall Conclusion
Bidwell Bar Bridge Dispersed Site	Winter	Moderate	Moderate	Low / No	Moderate	Low / No	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Moderate	<b>Moderate</b>
	Summer	Moderate	Moderate	Low / No	High	Low / No	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>High</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	
Canyon Creek Bridge Dispersed Site	Winter	Moderate	Moderate	Low / No	Moderate	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	<b>Moderate</b>
	Summer	Moderate	Moderate	Low / No	Extreme	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Moderate	
	<b>Overall</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>High</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	
Highway 162 Dispersed Site	Winter	Moderate	Moderate	Low / No	Moderate	Low / No	Low / No	Low / No	High	Moderate	Low / No	Low / No	Low / No	<b>Moderate</b>
	Summer	Moderate	Moderate	Low / No	Moderate	Low / No	Low / No	Low / No	High	Moderate	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>High</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
McCabe Cove	Winter	Low / No	Moderate	Low / No	Moderate	Low / No	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	<b>Moderate</b>
	Summer	Low / No	Moderate	Low / No	High	Low / No	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>High</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
OWA – Vance Ave Entrance Dispersed Use Area	Winter	Low / No	Low / No	Low / No	Moderate	Low / No	Moderate	Moderate	High	Low / No	Moderate	Low / No	Moderate	<b>Moderate</b>
	Summer	Low / No	Low / No	Low / No	Moderate	Low / No	Moderate	Moderate	High	Low / No	Moderate	Low / No	Moderate	
	<b>Overall</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Moderate</b>	<b>High</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Moderate</b>	
Parrish Cove	Winter	Moderate	Moderate	Low / No	Moderate	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	<b>Moderate</b>
	Summer	Moderate	Moderate	Low / No	Moderate	Low / No	Low / No	Moderate	Low / No	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	
West Branch Bridge Dispersed Site	Winter	Moderate	High	Low / No	High	Low / No	Low / No	Moderate	Moderate	Low / No	Low / No	Low / No	Moderate	<b>Moderate</b>
	Summer	Moderate	High	Low / No	High	Low / No	Low / No	Moderate	Moderate	Low / No	Low / No	Low / No	Low / No	
	<b>Overall</b>	<b>Moderate</b>	<b>High</b>	<b>Low / No</b>	<b>High</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Low / No</b>	<b>Moderate</b>	

Note: Rankings range from Low; to Moderate, to High, to Extreme.  
Source: EDAW Inc. (2003)

**Figure 5.2-2. Dispersed Recreation Sites and Areas with High Concerns**

8.5 x 11 insert





**OWA – Pacific Heights Road/Highway 70 Entrances Dispersed Use Area.** Four indicators were identified as having high concerns in this use area including trash accumulation, user-defined trails, OHV use, and water/shoreline impact.

**OWA – Palm Avenue Entrance Dispersed Use Area.** Two indicators were identified as having high concerns in this use area: trash accumulation and OHV impact.

**Ponderosa Dam Dispersed Site.** This site was identified as having high OHV use concerns resulting in soil erosion, some of which is close to the shoreline (especially at higher pool levels). Additionally, trash accumulation was identified as a high concern.

### **Discussion of Dispersed Recreation Sites and Areas of Moderate Concern**

**Bidwell Bar Bridge Dispersed Site.** Trash accumulation was a high concern at this site, as litter was distributed throughout the site. Additionally, soil erosion and compaction were noted to be of moderate concern at the site (although most of the erosion at this site was due to gulying and runoff from the closed, abandoned road that accesses the shore).

**Canyon Creek Bridge Dispersed Site.** Trash accumulation was identified as a high concern at this site. Additionally, prevalence of user-defined trails, water/shoreline issues, soil erosion, and soil compaction were identified as moderate concerns at this site.

**Highway 162 Dispersed Site.** Soil erosion and compaction were a few of the indicators that categorize the Highway 162 crossing of the Afterbay as a dispersed site of moderate concern. Additionally, OHV-use was identified as a high concern at this site.

**McCabe Cove.** Trash accumulation was identified as a high concern at this site, and impacts related to OHV use and soil compaction were identified as moderate concerns.

**OWA – Vance Avenue Entrance Dispersed Use Area.** Concerns at the Vance Avenue Dispersed Use Area are similar to those at other areas within the OWA, yet these concerns are not as extensive as the other areas. Moderate concerns include trash accumulation, vegetation damage, prevalence of user-defined trails, riparian impacts, and water quality/shoreline impacts. However, OHV use was identified as high concern in this dispersed use area.

**Parrish Cove.** Soil erosion, soil compaction, trash accumulation, and the prevalence of user-defined trails were noted as moderate concerns at this site.

**West Branch Bridge Dispersed Site.** Soil erosion, the prevalence of user-defined trails, OHV use, and water/shoreline impacts were identified as moderate concerns at

this site. Additionally, soil compaction and trash accumulation were high concerns at this site.

### **5.3 OVERALL ASSESSMENT OF RECREATION AND PUBLIC USE IMPACT AT STUDY AREA TRAILS**

This section summarizes recreation and public use impacts along study area trails. In general, trails within the study area have limited recreation and public use impacts. However, all of the trails showed some signs of erosion typical of trails in semi-arid areas. Table 5.3-1 summarizes the recreation and public use impacts along study area trails. Trash accumulation was noted as a moderate concern along the Lime Saddle Loop Trail. Vegetation damage, wetland, and riparian impacts were not identified as concerns during pedestrian surveys of these trails. Site-specific information is presented below.

- ⊘ **Brad Freeman Trail** – In general, the Brad Freeman Trail is in good condition. Soil erosion was noted as a moderate concern along this trail, particularly along the western end of the trail where it has not been hardened.
- ⊘ **Dan Beebe Trail** – Recreation and public use impacts along the Dan Beebe Trail are generally minimal; however, soil erosion was noted along the trail route.
- ⊘ **Lime Saddle Loop Trail** – Soil erosion and trash accumulation were noted as moderate concerns along this trail route.
- ⊘ **Loafer Creek Loop and Roy Rogers Trails** – Soil erosion was noted as a moderate concern along this trail route.

**Table 5.3-1. Recreation and Public Use Impacts Along Study Area Trails.**

Recreation Site or Area	Observation	Soil Erosion	Trash Accumulation	Sanitation Issues	Vegetation Damage	Wetland Impact	Riparian Impact	Overall Conclusion
Brad Freeman Trail	Winter	Moderate	Low	Low	Low	Low	Low	<b>Low</b>
	Summer	Moderate	Low	Low	Low	Low	Low	
	<b>Overall</b>	<b>Moderate</b>	<b>Low</b>	<b>Low</b>	<b>Low</b>	<b>Low</b>	<b>Low</b>	
Dan Beebe Trail	Winter	Moderate	Low	Low	Low	Low	Low	<b>Low</b>
	Summer	Moderate	Low	Low	Low	Low	Low	
	<b>Overall</b>	<b>Moderate</b>	<b>Low</b>	<b>Low</b>	<b>Low</b>	<b>Low</b>	<b>Low</b>	
Lime Saddle Loop Trail	Winter	Moderate	Low	Low	Low	Low	Low	<b>Low</b>
	Summer	Moderate	Moderate	Low	Low	Low	Low	
	<b>Overall</b>	<b>Moderate</b>	<b>Moderate</b>	<b>Low</b>	<b>Low</b>	<b>Low</b>	<b>Low</b>	
Loafer Creek Loop and Roy Rogers Trails	Winter	Moderate	Low	Low	Low	Low	Low	<b>Low</b>
	Summer	Moderate	Low	Low	Low	Low	Low	
	<b>Overall</b>	<b>Moderate</b>	<b>Low</b>	<b>Low</b>	<b>Low</b>	<b>Low</b>	<b>Low</b>	

*Note: Rankings range from Low, to Moderate, to High, to Extreme.  
Source: EDAP 2003.*

## **6.0 ANALYSIS AND CONCLUSIONS**

Overall, developed recreation sites are generally in good condition and most sites exhibit limited public use impacts. Maintenance of these sites is generally regular and appears to be fairly effective. Of the 36 developed recreation sites and areas investigated, only five sites were of high concern. These concerns were not considered to be Project-wide, but site-specific.

Dispersed recreation sites and use areas, however, have a higher percentage of concerns, especially within the OWA. Of the 13 dispersed sites and areas investigated, five sites had high concerns. Due to this frequency, these concerns are considered “Project-wide.”

This report was prepared under the direction of DWR staff. Opinions, conclusions, and findings expressed in this report are those of the authors. This report does not express the official position of the DWR unless approved by the Director or his designee.

Potential management considerations are discussed below to help address Project-wide and site-specific recreation and public use impacts.

### **6.1 MANAGEMENT CONSIDERATIONS FOR PROJECT-WIDE CONCERNS RELATED TO RECREATION AND PUBLIC USE IMPACTS**

This section analyzes the indicators that were identified as being issues Project-wide. Potential management considerations are presented to address identified concerns. Site-specific impacts are addressed in Section 6.2.

Potential management responses in the study area to commonly observed Project-wide concerns include:

- € Placement and servicing of trash receptacles at sites with excessive amounts of accumulated litter;
- € Providing visitor education regarding low impact recreational techniques;
- € Hardening of heavily used areas to reduce vegetation damage and erosion (site hardening addresses resource impacts through engineering solutions, such as surfacing with gravel);
- € Providing visitor education regarding the potential impacts of use near river and reservoir shorelines;
- € Limiting the number of OHV roads or OHV access to some dispersed use areas;
- € Providing visitor education regarding potential OHV use impacts in sensitive ecological areas (e.g., wetland, riparian); and
- € Periodic monitoring of conditions over time using current data as a baseline, and adapting management responses to changes in use over time.

Concerns and responses such as these are not unique to the Oroville Facilities. The possible management responses listed here are examples of actions that have been employed by other recreation area managers, and are often applicable to resource impacts such as those observed in this study.

#### **6.1.1 Project-Wide Developed Recreation Site Management Considerations**

There were no indicators considered to be widespread and of extreme or high concern on a Project-wide basis at developed recreation sites.

#### **6.1.2 Project-Wide Dispersed Recreation Site and Use Area Management Considerations**

Three indicators were considered to be high concerns and Project-wide issues at several dispersed sites and use areas. The facility concerns noted are site-specific.

##### **6.1.2.1 OHV Use**

Impacts related to OHV use are of high concern at several dispersed use sites and areas, especially within the OWA. This is a concern in the OWA as extensive soil and vegetation damage has occurred, especially considering that OHV-use is prohibited. It is suggested that preventing OHV use be emphasized in certain sensitive areas by creating vehicle barriers, increasing the frequency of enforcement, and public awareness activities.

##### **6.1.2.2 Trash Accumulation**

Trash accumulation was identified as a high concern at several dispersed recreation sites and use areas. It appears that trash pick-up does not occur regularly – if at all – at several dispersed sites and use areas. Either additional periodic trash pick-up or a more-focused public awareness campaign should be considered at selected dispersed use sites.

##### **6.1.2.3 User-Defined Trails**

The prevalence of many user-defined trails is of high concern, Project-wide, at dispersed recreation sites and use areas. Dispersed sites rarely see management attention and intervention, and users have created trails to reach the shoreline that are often too steep or near the shore, thus erosion is prevalent. At especially popular sites, short, new, developed trails with proper slope and drainage could be considered to help reduce impacts at selected dispersed sites and use areas.

### **6.1.3 Project-Wide Trail Management Considerations**

There were no indicators found to be of extreme or high concern on a Project-wide basis along study area trail routes.

## **6.2 MANAGEMENT CONSIDERATIONS FOR SITE-SPECIFIC HIGH CONCERNS AT RECREATION SITES, USE AREA, AND TRAILS**

This section summarizes recreation and public use impacts at developed sites and dispersed recreation sites and use areas.

### **6.2.1 Developed Recreation Sites and Areas**

This section summarizes management considerations at the five developed recreation sites with high concerns, listed below.

- € **Afterbay Outlet Campground and DUA** – There are high concerns related to recreation impacts at this site. Additional management actions that may be considered to address these concerns include improved site definition and hardening (to prevent the impact from expanding), and an implementation of an interpretation and education program at this site (to inform users of potential impacts and behavioral changes desired).
- € **Clay Pit SVRA** – As might be expected, this site has significant recreation and public use impacts related to OHV use. However, this site provides a unique opportunity for OHV users and concentrates OHV-related impacts in one area, rather than dispersing those impacts over a large area. Therefore, the impact in this zone is generally acceptable, as long as it is contained. If OHV is not contained at this site, it would likely increase in areas where it is less appropriate as users look for alternative locations. Therefore, an appropriate management consideration for this site is that of continued containment.
- € **Foreman Creek Car-top BR** – This site was identified as a site with high concerns as soil erosion, trash accumulation, and water quality (noticeable turbidity) were identified. However, a significant portion of the turbidity is likely caused by wind. Damage to prehistoric cultural resources has also been observed as a part of other relicensing studies. It appears that these impacts are more pronounced at lower pool levels as the shoreline becomes more exposed; a management consideration may be to limit access to vehicles at this site at lower pool levels.
- € **Rabe Road Shooting Range** – This site was identified as having high concerns related to soil erosion, as well as having extreme concerns related to trash accumulation. There were large amounts of gun shell casing on the ground

during the two site observation periods. Once again, this site provides a unique opportunity for visitors to the study area; however, trash accumulation is an issue of concern at this site. A potential management solution may be that additional trash collection take place at this site.

- € **Saddle Dam DUA** – The prevalence of user-defined trails at this site is a high concern and has resulted in some soil erosion in the vicinity of the site. These trails may lead to erosion and gulying, given the steepness of the site. It is also important to note that some of the erosion at this site is due to the reservoir inundation zone. To address this concern, additional site hardening and/or erosion control-related trail improvement measures could be considered at the parking lot and along short access trails.

### **6.2.2 Site-Specific Dispersed Recreation Site and Use Area Management Considerations**

This section summarizes management considerations at the five dispersed recreation sites and use areas with high concerns, listed below.

- € **Old Nelson Bar Road Dispersed Site** – This site receives a fair amount of OHV use when the pool level is down. Such use leads to soil erosion near the shoreline. Erosion could be reduced if this area is closed to vehicle traffic during times when there are very low pool levels.
- € **OWA - Headquarters Entrance Dispersed Use Area** – There are several indicators identified as moderate or high concerns within this dispersed use area. Overall, additional management actions appear necessary to limit these site impacts. Management actions may include limiting the number of OHV trails and providing additional developed facilities to prevent OHV use in the OWA (OHVs are not allowed in the OWA). However, when considering recreation development in the OWA, it should be considered that recreation is secondary to providing wildlife habitat.
- € **OWA - Pacific Heights Road/Highway 70 Entrances Dispersed Use Area** – This dispersed use area was identified as having high concerns related to public use impacts. Management actions may include limiting the number of OHV trails and providing additional developed facilities to prevent OHV use in the OWA.
- € **OWA - Palm Avenue Entrance Dispersed Use Area** – This dispersed use area was identified as having high concerns related to public use impacts. Management actions may include limiting the number of OHV trails and providing additional developed facilities to prevent OHV use in the OWA.

- € **Ponderosa Dam Dispersed Site** – Similar to the Old Nelson Bar Road Dispersed Site, this site was identified as having high OHV-use impacts resulting in soil erosion, some of which is close to the shoreline (especially at higher pool levels). In the future, additional monitoring may help develop options so that appropriate management action can be taken (such as limiting vehicular access to the site) if necessary.

### **6.2.3 Site-Specific Trail Management Considerations**

There are no trails in the study area considered to be of high concern. As a result, no site-specific management actions are necessary on trails at this time.



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## **7.0 REFERENCES**

### **7.1 DOCUMENTS**

- DWR (California Department of Water Resources) and DPR (California Department of Parks and Recreation). 1993. Agreement Concerning the Operation of the Oroville Division of the State Water Project for Management of Fish & Wildlife.
- DWR. 2003. SP-R10 – Recreation Facility Inventory and Condition Report. Produced for Oroville Facilities Relicensing (FERC 2100).
- DWR. In Preparation. SP-T9 – Recreation and Wildlife. Produced for Oroville Facilities Relicensing (FERC 2100).
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- Hammitt, W.E. and D.N. Cole. 1998. Wildland Recreation: Ecology and Management—2nd Edition. John Wiley and Sons, Inc. New York, NY.
- Hendee, J.C. and C.P. Dawson. 2002. Wilderness Management: Stewardship and Protection of Resources and Values. Fulcrum Publishing, Golden, CO. 3rd Edition.
- NOAA (National Oceanic and Atmospheric Administration) Fisheries. 2000 Biological Opinion on Central Valley Project Improvement Act.

### **7.2 PERSONAL COMMUNICATIONS**

- Feazel, Steve, Chief Ranger, N. Buttes District, DPR. 2003. E-mail to Donna Plunkett, EDAW, Inc., June 18, 2003.
- Kastner, Anna. Hatchery Manager, Feather River Fish Hatchery, DFG. 2003. Personal correspondence with Ian Ferguson, of EDAW, Inc., July, 2003.
- Rischbieter, Doug, Staff Environmental Scientist, DWR. 2003. Phone Interview with Bill Spain, EDAW, Inc., September 26, 2003; and Personal Correspondence, March 1, 2003.

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## **Appendix A**

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### ***Recreation and Public Use Impact Assessment Forms***



# **ECOLOGICAL IMPACT ASSESSMENT FORM (Lake Oroville)**

*(This form used at Developed Recreation Sites)*

**Project Name:** LAKE OROVILLE **Site Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Researcher:** \_\_\_\_\_ **Roll:** \_\_\_\_\_ **Photos:** \_\_\_\_\_

INDICATORS		NOTES				
<b>Soil</b>						
Soil Compaction evident		£ None	£ Some	£ Moderate	£ Extensive	
Erosion evident		£ None	£ Some	£ Moderate	£ Extensive	
Noticeable dirt or fugitive dust from vehicles/people (particularly from unpaved roads)		£ None	£ Some	£ Moderate	£ Extensive	
	Notes					
<b>Trash Accumulation</b>						
		£ none to little 0-1	£ some pieces of trash at site 2-5	£ trash very noticeable 6+		
	Notes					
<b>Sanitation</b> Toilet paper		£ None	£ Some	£ Moderate	£ Extensive	
State of Restrooms (if available)		£ Clean	£ Moderately Clean	£ Not Clean	£ Dirty	
	Notes					
<b>Tree / Shrub Damage</b> Exposed roots		£ none	£ a few roots exposed	£ roots are exposed on more than 25% of the trees	£ roots are exposed on more than 50% of the trees	£ roots are exposed on more than 75% of the trees
Broken limbs, gashes, or other damage		£ none	£ <10% of trees	£ 10-25% of trees	£ 25-50% of trees	£ greater than 50% of the trees
	Notes					
<b>User Defined Trails (informal)</b>		£ none	£ 1-2	£ 3-5	£ 5-10	£ >10
Average width:		£ <12"	£ 12-24"	£ >24"		
Average depth:		£ same level as adjacent area	£ slightly deeper than adjacent area (1")	£ deeper than adjacent area (2-3")	£ significantly deeper than adjacent areas (>4")	
Soil Compaction		£ Noticeable	£ Not Noticeable			
Note destination of trail/s						
	Notes					

<b>Proximity to Wetlands</b>	Less than 200 Feet	YES <input type="checkbox"/>	NO <input type="checkbox"/>		
Note the distance from the closest portion of the site to wetlands (if in area).					
Noticeable erosion near wetlands	<input type="checkbox"/> none	<input type="checkbox"/> some	<input type="checkbox"/> moderate	<input type="checkbox"/> extensive	
Notes					
<b>Trampling Noticeable (Near Wetlands)</b>	<input type="checkbox"/> none	<input type="checkbox"/> limited trampling	<input type="checkbox"/> moderate trampling apparent	<input type="checkbox"/> extensive trampling apparent	
Notes					
<b>Proximity to Riparian</b>	Less than 200 Feet	YES <input type="checkbox"/>	NO <input type="checkbox"/>		
Note the distance from the closest portion of the site to a riparian zone.					
Noticeable erosion near riparian zone	<input type="checkbox"/> none	<input type="checkbox"/> some	<input type="checkbox"/> moderate	<input type="checkbox"/> extensive	
Notes					
<b>Proximity to Shoreline</b>	<input type="checkbox"/> <50 ft.	<input type="checkbox"/> 50-100 ft.	<input type="checkbox"/> 100-150 ft.	<input type="checkbox"/> 150-200 ft.	<input type="checkbox"/> >200 ft.
Note the distance from the closest portion of the site to the shoreline.					
Noticeable erosion near shoreline	<input type="checkbox"/> none	<input type="checkbox"/> some	<input type="checkbox"/> moderate	<input type="checkbox"/> extensive	
Notes					
<b>Downed wood</b>	<input type="checkbox"/> none	<input type="checkbox"/> some	<input type="checkbox"/> moderate	<input type="checkbox"/> extensive	
Availability of downed wood at site (Greater than 3 inches of width)					
Notes					
<b>Human-Made Disturbances / Built Structures</b>					
Note any other impacts on the site as a result to public use and recreation (Use back of sheet – if necessary.					

**ECOLOGICAL IMPACT ASSESSMENT FORM (Lake Oroville)**  
*(This form used at Dispersed Recreation Sites and Areas)*

**Project Name:** LAKE OROVILLE **Site Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Researcher:** \_\_\_\_\_ **Roll:** \_\_\_\_\_ **Photos:** \_\_\_\_\_

INDICATORS		NOTES				
<b>Soil</b> % bare ground within site		£ 0-25%	£ 26-50%	£ 51-75%	£ 76-100%	
Soil Compaction evident		£ None	£ Some	£ Moderate	£ Extensive	
Erosion evident		£ None	£ Some	£ Moderate	£ Extensive	
Noticeable dirt or fugitive dust from vehicles/people (particularly from unpaved roads)		£ None	£ Some	£ Moderate	£ Extensive	
	Notes					
<b>Trash Accumulation</b>		£ none to little 0-1	£ some pieces of trash at site 2-5	£ trash very noticeable 6+		
	Notes					
<b>Sanitation</b> Toilet paper		£ None	£ Some	£ Moderate	£ Extensive	
State of Restrooms (if available)		£ Clean	£ Moderately Clean	£ Not Clean	£ Dirty	
	Notes					
<b>Tree / Shrub Damage</b> Exposed roots		£ none	£ a few roots exposed	£ roots are exposed on more than 25% of the trees	£ roots are exposed on more than 50% of the trees	£ roots are exposed on more than 75% of the trees
Broken limbs, gashes, or other damage		£ none	£ <10% of trees	£ 10-25% of trees	£ 25-50% of trees	£ greater than 50% of the trees
	Notes					
<b>User Defined Trails (informal)</b>		£ none	£ 1-2	£ 3-5	£ 5-10	£ >10
Average width:		£ <12"	£ 12-24"	£ >24"		
Average depth:		£ same level as adjacent area	£ slightly deeper than adjacent area (1")	£ deeper than adjacent area (2-3")	£ significantly deeper than adjacent areas (>4")	
Soil Compaction		£ Noticeable	£ Not Noticeable			
	Note destination of trail/s					
	Notes					



<b>Proximity to Wetlands</b>	Less than 200 Feet	YES <input type="checkbox"/>	NO <input type="checkbox"/>		
Note the distance from the closest portion of the site to wetlands (if in area).					
Noticeable erosion near wetlands	<input type="checkbox"/> none	<input type="checkbox"/> some	<input type="checkbox"/> moderate	<input type="checkbox"/> extensive	
Notes					
<b>Trampling Noticeable (Near Wetlands)</b>	<input type="checkbox"/> none	<input type="checkbox"/> limited trampling	<input type="checkbox"/> moderate trampling apparent	<input type="checkbox"/> extensive trampling apparent	
Notes					
<b>Proximity to Riparian</b>	Less than 200 Feet	YES <input type="checkbox"/>	NO <input type="checkbox"/>		
Note the distance from the closest portion of the site to a riparian zone.					
Noticeable erosion near riparian zone	<input type="checkbox"/> none	<input type="checkbox"/> some	<input type="checkbox"/> moderate	<input type="checkbox"/> extensive	
Notes					
<b>Proximity to Shoreline</b>	<input type="checkbox"/> <50 ft.	<input type="checkbox"/> 50-100 ft.	<input type="checkbox"/> 100-150 ft.	<input type="checkbox"/> 150-200 ft.	<input type="checkbox"/> >200 ft.
Note the distance from the closest portion of the site to the shoreline.					
Noticeable erosion near shoreline	<input type="checkbox"/> none	<input type="checkbox"/> some	<input type="checkbox"/> moderate	<input type="checkbox"/> extensive	
Notes					
<b>Downed wood</b>	<input type="checkbox"/> none	<input type="checkbox"/> some	<input type="checkbox"/> moderate	<input type="checkbox"/> extensive	
Availability of downed wood at site (Greater than 3 inches of width)					
Notes					
Estimated Use Level	<input type="checkbox"/> heavy	<input type="checkbox"/> moderate	<input type="checkbox"/> low		
Last time site appears to have been used	<input type="checkbox"/> within last year	<input type="checkbox"/> 1-2 years	<input type="checkbox"/> greater than 2 years _____		
Overnight Use apparent	YES <input type="checkbox"/>	NO <input type="checkbox"/>			
Evidence of Campfires	YES <input type="checkbox"/>	NO <input type="checkbox"/>			
Evidence of ORV use	YES <input type="checkbox"/>	NO <input type="checkbox"/>			
Notes					
<b>Human-Made Disturbances / Built Structures</b>					
Note any other impacts on the site as a result to public use and recreation (Use back of sheet – if necessary).					

**SHORELINE ECOLOGICAL IMPACT ASSESSMENT**  
*(This form used at Developed Recreation Sites located near the shoreline)*

**Project Name:** LAKE OROVILLE **Site Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Researcher:** \_\_\_\_\_ **Roll:** \_\_\_\_\_ **Photos:** \_\_\_\_\_

INDICATORS	NOTES			
<b>Water Quality</b> Noticeable oil or sheen on or near water    	£ None	£ Some	£ Moderate	£ Extensive
Noticeable turbidity in water    	£ None	£ Some	£ Moderate	£ Extensive
Algae / Plant life in water Notes 	£ None	£ Some	£ Moderate	£ Extensive
<b>Trash Accumulation on water or on shoreline</b> Notes 	£ none to little 0-1	£ some pieces of trash at site 2-5	£ trash very noticeable 6+	
<b>Sanitation</b> Restroom / Outhouse distance from water Leakage apparent Notes 	£ <25 ft. £ Noticeable	£ 25-50 ft. £ Not Noticeable	£ 50-75 ft.	£ 75-100 ft.
<b>Erosion near Shoreline</b> Noticeable erosion near shoreline Notes 	£ none	£ some	£ moderate	£ extensive
	Natural cause likely	Yes £	No £	
	Man-made erosion evident	Yes £	No £	
<b>Human-Made Disturbances /Built Structures</b>  Note any other impacts on the site as a result to public use and recreation				



## **Appendix B**

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### ***Representative Photos of Observed Impacts at Study Area Recreation Sites and Use Areas***





**Photo #1 Trampling Near Wetlands (Monument Hill Dispersed Use Site)**



**Photo #2 OHV Impact at Monument Hill Dispersed Site**





**Photo #3 Trash Accumulation in Oroville Wildlife Area (Near Afterbay Outlet Campground and Day Use Area)**



**Photo #4 User-defined Trails Leading to Restroom (Lime Saddle Campground)**

*Proposed Final Draft – For Distribution to Collaborative*

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**Photo #5 Trash Accumulation at Bidwell Bar Bridge Dispersed Site**



**Photo #6 Recreation Use at McCabes Cove Dispersed Site**





**Photo #7 Old Road leading to Bidwell Bar Dispersed Use Site**



**Photo #8 User-defined Trail leading to West Branch Bridge Dispersed Site**

